ROCK PRODUCTS AND QUARRY

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PERIODICAL DIVISION

JULY, 1939

ANNUAL CEMENT-MILLS NUMBER

TN1
.P65

This Mechanical Colossus wears a MANHATTAN BELT

. . . built to deliver a peak load of 800 tons of overburden per hour 190 feet across quarry bench from working face to spoil pile in a large Pennsylvania quarry.

The 54-inch, anti-friction Manhattan Conveyor Belt on this recently built Link-Belt mechanical, traveling stacker conveyor is all set for a tough job. Though baked by summer sun and glazed by winter snow and ice, it has "what it takes" to stand up and deliver under a constant bombardment of abrasive and occasional large lumps of earth, clay and shale. In this it is no different from hundreds of other Manhattan Belts in mines, quarries, construction, which—by year 'round performance—show upon the books as the "right belt for the job."

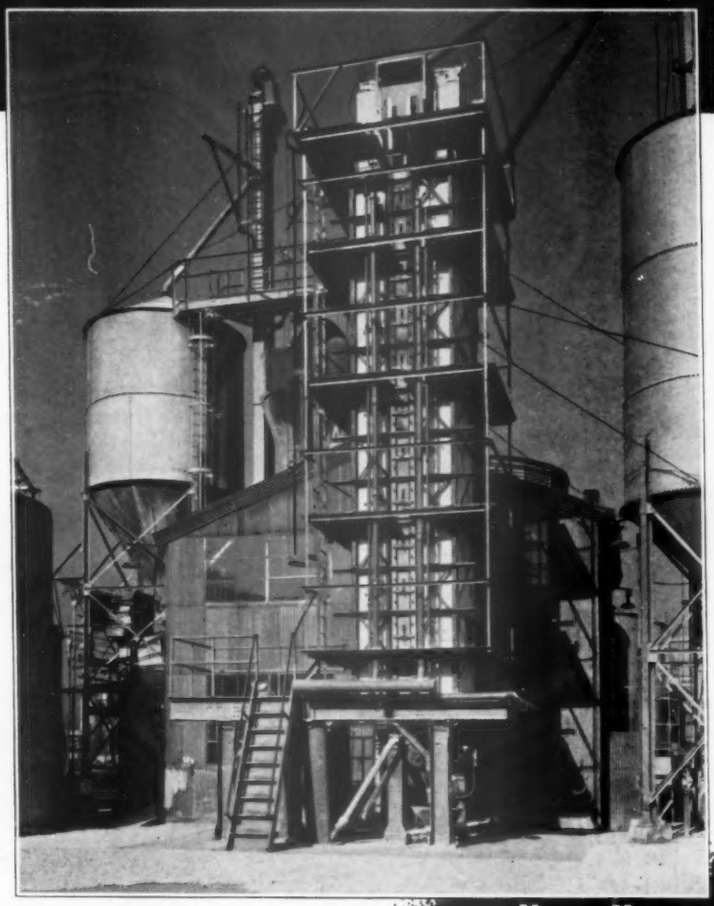
Manhattan's engineers welcomed the opportunity to build this belt. For 46 years, they have built tough belts for tough jobs that helped solve many an unusual problem. Their experience covers every phase of conveyor belt design and construction . . . every material and condition. Write for Manhattan's Conveyor Belt Bulletin 6862. When you replace, let Manhattan's engineers make specific recommendations for increasing tonnage and lowering costs with a Manhattan Belt.

Condor PRODUCTS

Conveyor and Elevator Belt	Hydraulic Hose	Launder Lining
Transmission Belt	Oil and Gasoline Hose	Industrial Brake Blocks and Lining
V-Belt	Sand Blast Hose	Molded Rubber Goods
Air Hose	Steam Hose	Rubber Lined Tanks
Contractors Hose	Suction Hose	Rubber Covered Rolls
Fire Hose	Water Hose	Abrasive Wheels
	Chute Lining	

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES AND FACTORIES
12 Townsend St., Passaic, N. J.

$CO_2 + CaO = 2$ Profits



The new retort or kiln in which indirect heat is used to produce pure CO_2 gas and lime.

Make Pure Carbon Dioxide Make High Grade Lime ...AT THE SAME TIME... FROM YOUR FINE STONE

IN your present lime kilns, enough Carbon Dioxide goes up the flues to pay your entire overhead and leave your lime sales nearly all profit.

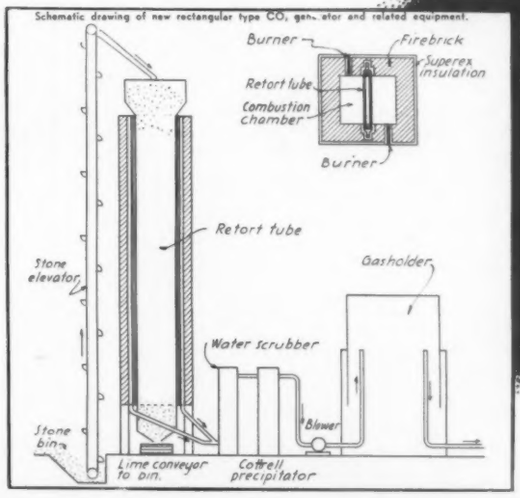
The Gillette process gives you a high grade lime and a pure Carbon Dioxide at the same time ... at a very low cost ... nearly as low as your present costs. The CO_2 can be sold to chemical industries, or sold as Dry Ice. A single kiln produces $4\frac{1}{2}$ tons of lime and 3 tons of Carbon Dioxide daily. No purification process is needed for the CO_2 ..... it comes from the kiln pure and odorless.

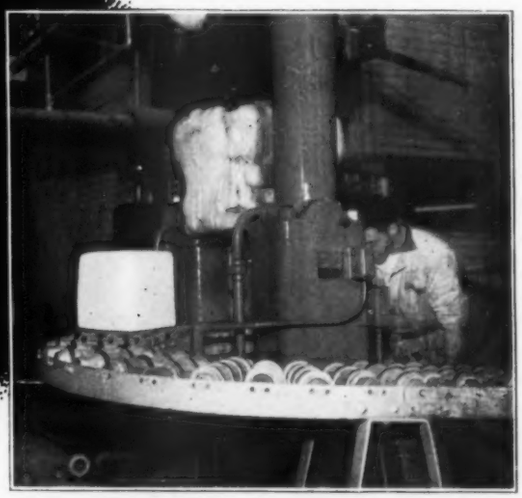
The process has been in operation for 4 years ... is past experimental stage and a proven proposition. Be the one in your territory to profit from it.

You Have Established Sales Outlets for LIME— and DRY ICE Has Ready Markets

INVESTIGATE TODAY

Schematic drawing of new rectangular type CO_2 generator and related equipment.



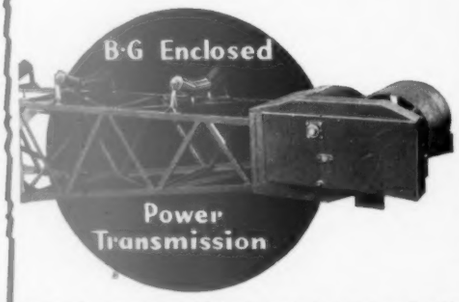


GILLETTE KILN SALES COMPANY

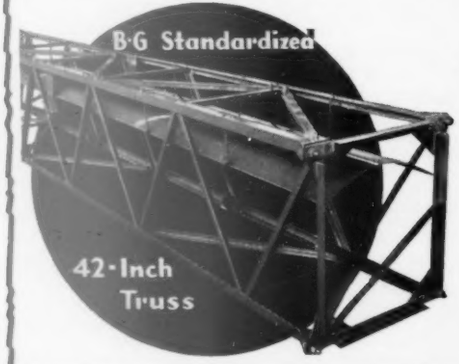
NEVILLE ISLAND — PITTSBURGH, PENNA.

PIT AND QUARRY, July, 1939. Vol. 32, No. 1. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

Via Barber-Greenes



B-G Standardized Units include 24" and 42" deep Steel Truss, Enclosed Power Transmission, Head End Drives, Wrap Drives, Various Types of Take-Ups, A Frames, Walkways, etc. All unit parts and assemblies are accurately rated, giving the individuality of a "tailor made" conveyor plus the many additional advantages of standardization.



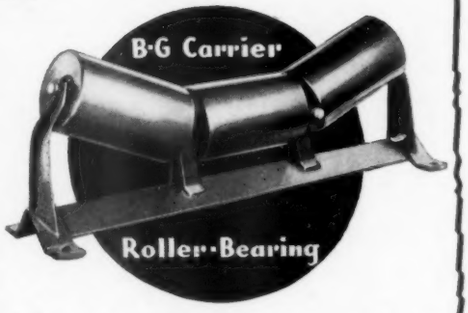
BELT conveyors offer by far the cheapest means of handling bulk materials. Barber-Greenes offer many additional advantages.

Having Pre-Engineered Standardized Unit Parts and Assemblies, the B-G Sales Engineer is able to make a quicker, more accurate price estimate, the Engineering Department is able to make a quicker, more practical lay-out.

This B-G Standardization lets us carry the parts in stock for practically any conveyor requirement — giving prompt shipment.

Erection is tremendously speeded up and simplified, and perfect alignment is assured.

B-G Standardization allows the addition of standard accessories later, and Barber-Greene Standardized Sectional Construction permits unequalled change of set-up to meet changing conditions.



B-G Carriers are recognized for their excellent design and performance records. They are available with plain, ball, or roller bearings. If you are replacing carriers or erecting your own conveyor, investigate B-G Carriers.

Solving your handling problems is our business.

Standardized Material-Handling Machines

BARBER GREENE

Aurora, Illinois, U.S.A.

38-10

MAKES ROCK Say "Uncle"

• Proof? Here's one case out of many. For 9 years Harry Hatfield & Co., Barboursville, W. Va., has been digging West Virginia rock with Lorains. This 1½-yd. Lorain-79 is his fifth. It is working on a 31,000-yd. rock cut and handles about 1500 yds. per shift. And you contractors, who know both rock and shovels, will agree that's an accomplishment.

If you want to get the upper hand of those tough rock jobs—and keep it—just leave the rough stuff to a 1½-yd. Lorain-79. Its husky, all-welded shovel boom, powerful Double Center Drive turntable, and dependable Center "Chain" Drive crawler offer an efficient working combination that's a match for any digging.

Write today for catalog. Examine first-hand the many features which make the "79" the outstanding 1 1/2-yd. shovel value for '39.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

1½ YD LORAIN 79

New World's Record...
...Set at Coulee Dam

A WORLD'S RECORD which many construction men believe will stand unchallenged for a century, if not for all time, was set May 25 when crews of Consolidated Builders Inc. placed 20,684 c. y. of concrete in Coulee Dam. Average production was one yard of concrete every 4.18 seconds, or 861 c. y. every hour . . . . . .

Theoretical capacity of the mixing plant (operating on a 2-minute mix) had been placed at 18,432 c. y. By clipping seconds, and half-seconds, at every corner this theoretical capacity actually was exceeded by 2,252 c. y.—or about one-ninth!

NO DELAYS—The story of the record pour is a story of superb engineering management, splendid esprit de corps and mechanical perfection, in which every man and every machine performed his or its allotted task perfectly. There were no mistakes, no mechanical failures and no delays. . . . . .

SYNCHRONIZATION—Involved in the operation are the world's largest cement-handling plant, aggregate plant, belt conveyors, concrete mixing plant and concrete placing equipment. Exactly synchronized and geared to maximum capacity, all of these gigantic units functioned flawlessly throughout the record-breaking day. ***From one mid-night to the next, the mixing plant never stopped a second, the eight 4-yd. mixers revolving and tilting continuously.*** . . . . . .

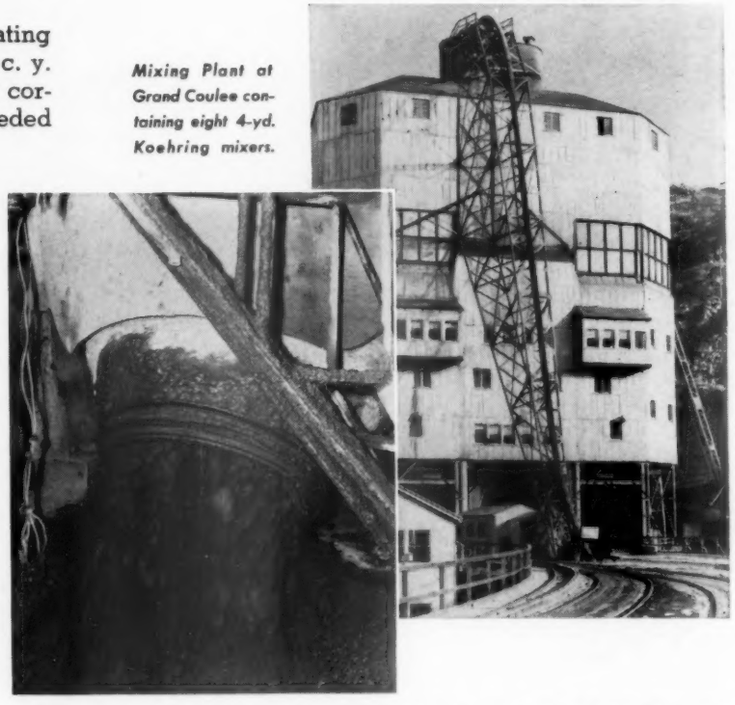
MIXING TIME REDUCED — Higher production of the day and swing shifts was aided by the fact that the Bureau of Reclamation allowed CBI to cut the mixing time five seconds in the morning and five more seconds in the afternoon and evening. Thus the graveyard shift used the normal two-minute mixing time, the day shift used 1 minute and 55 seconds; and the swing shift, 1 minute 50 seconds.

These successive reductions in mixing time were permitted because efficiency tests conducted by the Bureau's laboratories disclose that the resultant mix was in no way inferior to the regular 2-minute mix.

Efficiency tests are conducted periodically every day by Bureau engineers to determine if the cement is properly dispersed through the mix. If the mix is not within 10% uniform, the mixing time is increased. The 1 minute, 50 second mix ran well within the requirements of uniformity . . .

Excerpts from Pacific Builder and Engineer Issue of June 3, 1939.

CONGRATULATIONS to Consolidated Builders, Inc. for their Remarkable Achievement



Mixing Plant at Grand Coulee containing eight 4-yd. Koehring mixers.

Here's the sight that makes CBI officials smile. A 4-yd. Koehring mixer, such as this, dumps 24 batches an hour, sometimes 26 or 27. Theoretical capacity of the 8 4-yd. mixers, operating on a two-minute cycle, is 18,432 c.y. per day. They produced 20,684 c. y. on May 25 when mixing time was reduced. They operated for 24 consecutive hours without stopping once.

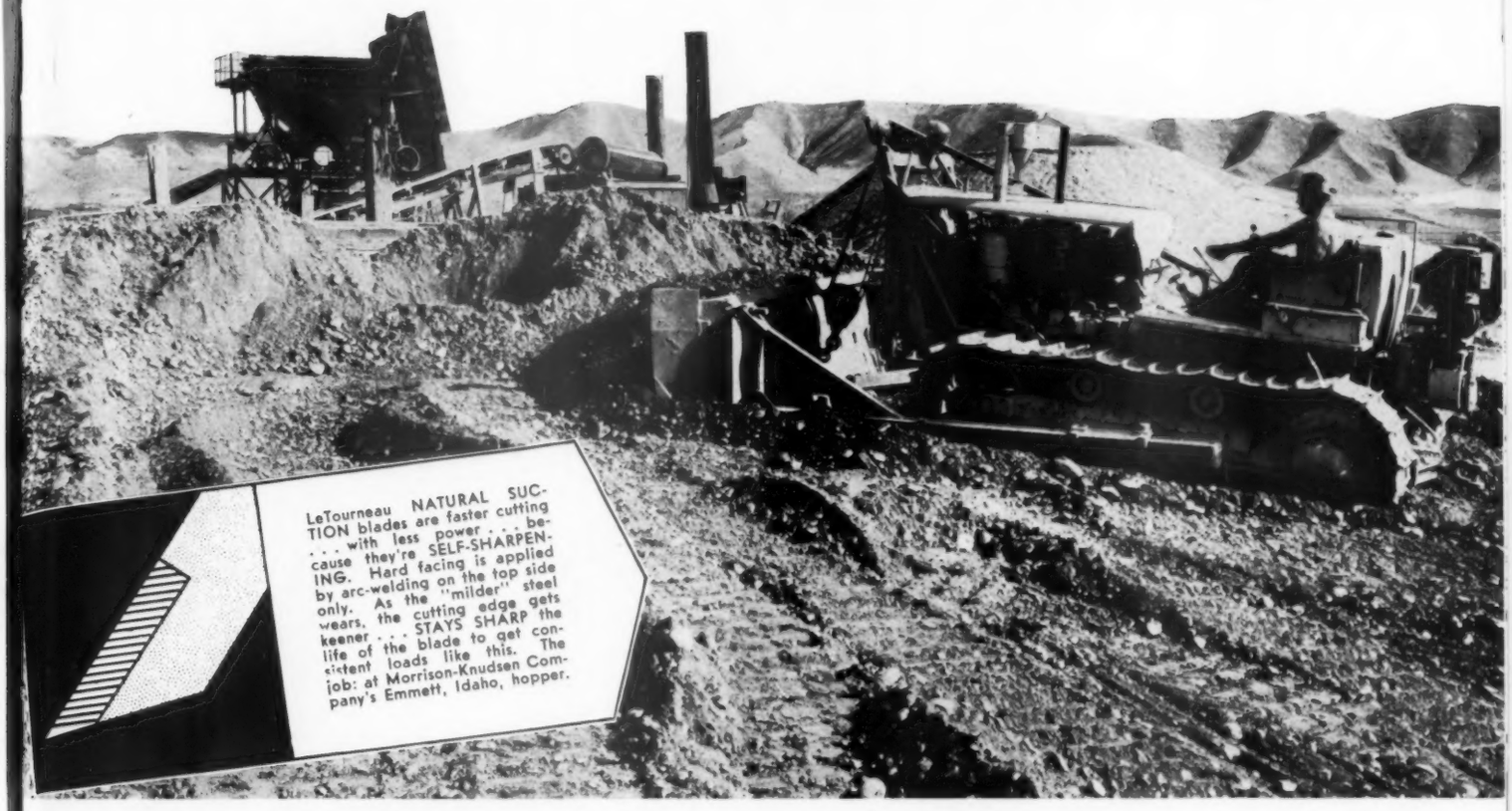
● **Koehring is indeed proud to have the privilege of being a part of the highly efficient organization for mixing and pouring concrete at this record breaking pace. We are proud Koehring mixers *did not fail* when called upon to do their share in establishing this record run. These mixers had poured more than 5,000,000 yards prior to this record run. Continuous service from Koehring equipment is that extra value you buy in all Koehring products.**

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

"GEARED to the GROUND"



LeTourneau NATURAL SUCTION blades are faster cutting . . . with less power . . . because they're SELF-SHARPENING. Hard facing is applied by arc-welding on the top side only. As the "milder" steel wears, the cutting edge gets keener . . . STAYS SHARP the life of the blade to get consistent loads like this. The job: at Morrison-Knudsen Company's Emmett, Idaho, hopper.

'DOZER TO CRANE IN 30 MINUTES

ONE power investment for 'Dozing and lifting are Northwestern Improvement Company's benefits from versatile LeTourneau cable control at its Gardner, Montana, quarry.

Interchange an ANGLEDOZER* or BULLDOZER with a LeTourneau TRACTOR CRANE on the SAME two-drum POWER CONTROL UNIT for your heavy lifting tasks. Combine 'Dozing with a ROOTER* on extra-tough excavation . . . it's safer and cheaper than blasting . . . or team 'Dozing with CARRYALL* SCRAPER operation. Ask, too, about LeTourneau DRAG SCRAPERS, PUSH-DOZERS, SHEEP'S FOOT ROLLERS and TREEDOZERS. You're certain to find a low-cost answer to your every stripping, road building and aggregates handling problem.

*Name Reg. U. S. Pat. Off.

When it comes to sheer digging ability . . . in ANY material . . . one fact stands out. There's no substitute for NATURAL digging suction . . . the LeTourneau PLOW-LIKE penetration kind that carries 'Dozer digging efficiency a step farther than most methods . . . develops DOWN-PULL that keeps tracks "geared to the ground."

Contrast this with so-called "down-pressure" that bears itself OUT in hard digging this way: Shove down, you raise the tractor weight and spin the tracks . . . less traction means less productive power. It's hard on the tractor . . . on the fuel bill . . . the maintenance bill. You've got to dig in NATURALLY if you're going to dig at all. And then you'd better have fast-acting, powerful LeTourneau cable control to check that blade suction at the right digging depth, because penetration is INSTANT.

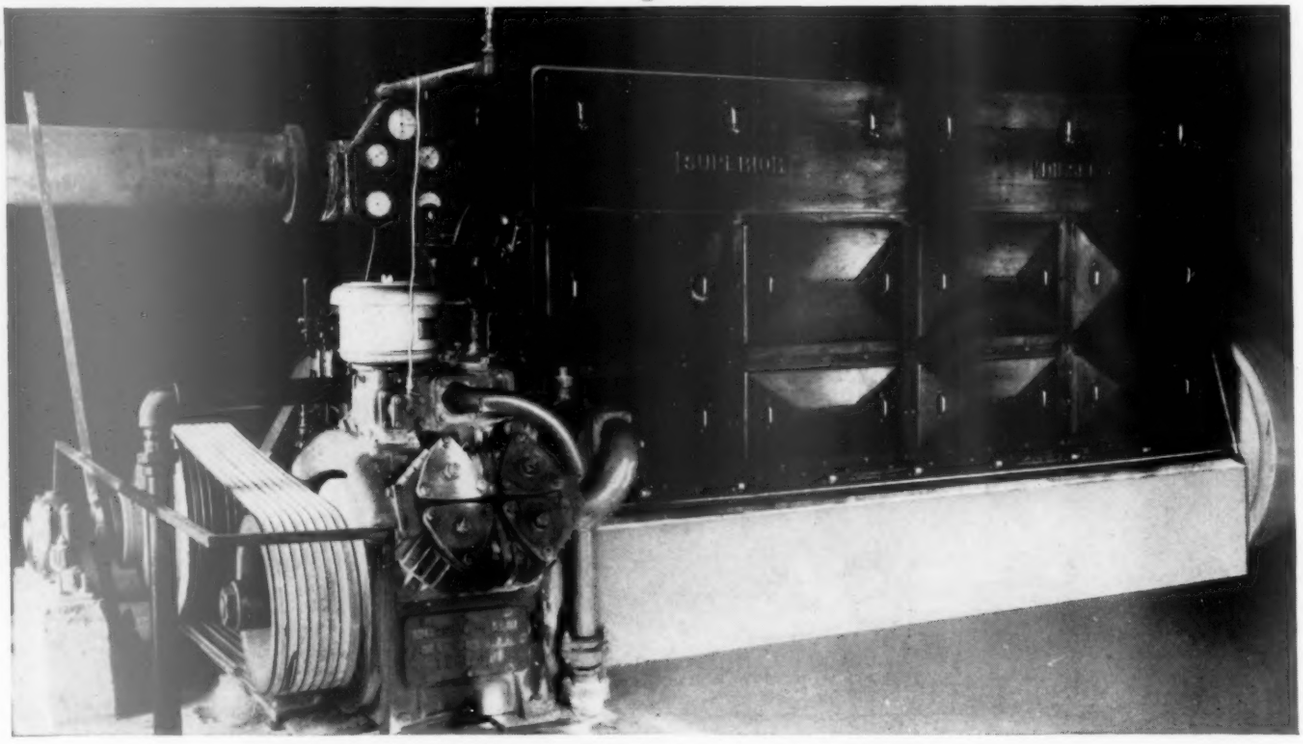
Once you put the rolling action of LeTourneau's mold-board 'Dozer bowl behind the load, you'll never go back to dead weight limitations on your tractor. You'll FEEL it's a LIVE load when the 'Dozer kicks it into the hopper or onto the stockpile at the first "flick" of the control lever, for here's where LeTourneau's patented box-beam, welded alloy steel construction really pays—in excessive weight eliminated . . . and tractor energy saved!

Get a complete picture of the savings with a LeTourneau demonstration . . . then make your comparisons right on your own operation. Your LeTourneau and "Caterpillar" dealer will make all arrangements at no obligation to you. See him today. R. G. LeTOURNEAU, INC., Peoria, Illinois, Stockton, California, Cable address: "Bobletorno."

LETOURNEAU

Stripping **EQUIPMENT**

ONE 350 H.P. SUPERIOR SAVES UP TO $900 A MONTH



Six-cylinder 9" x 12" Superior Diesel, direct connected to both air compressor and generator, furnishes all power for Charles Stone Company, Cypress, Illinois.

In addition to savings as high as $900 monthly, power and demand charges as high as $600 monthly in slack periods are eliminated.

This is another example where savings from a simple Superior Diesel installation will pay for it in two or three years.

J. B. Willebrand, Superintendent, says: "Monthly power bills formerly were between $1300 and $1400 when operating two shifts daily. Now they are about $500 with the Diesel, including operating and maintenance expense. Our high demand charges in slack periods are now eliminated."

An equally profitable installation may be possible for you, without requiring large cash outlay. Ask us about it!

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

TURNS GRAVEL PITS INTO GOLD MINES

Big in capacity, powerful and efficient . . . Austin-Western Portable Crushing Plants are built to deliver material in volume *at the job.* The high cost of haulage is eliminated . . . output costs are exceptionally low.

These factors . . . plus ready portability and quick, easy set-up in any location . . . is enabling this equipment to turn gravel pits into "gold mines" for producers throughout the United States and Canada. Records of profitable operation in locations less than 25 miles from fixed plants show that A-W Portables are enabling fixed plant owners to increase their percentage of successful bids while maintaining normal profits.

The consistently high output, economical operation and low maintenance cost of A-W Portable Crushing and Screening Plants are results of sound engineering and honest construction throughout. Deep jaws, operating at unusually high speeds on oversized shafts and oversized bearings, outperform and outlast all other crushers size for size. Screens, conveyors, etc., put out aggregate at top speed. There are no bottle necks to choke production. Write for performance records and full details. THE AUSTIN-WESTERN ROAD MACHINERY COMPANY, Aurora, Illinois.

★ Austin-Western ★

Motor Graders
Roll-A-Planes
Rollers
Snow Plows

Crushing and Screening Plants
Washing Plants
Blade Graders

Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders

5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

NEW

the modern 2 - yard leader shovel - dragline - crane

The Bucyrus-Erie 44-B offers you performance that means new highs in profit on your excavating. From dipper teeth to cats, it's MODERN. All the skill of the biggest, most experienced engineering staff in the industry; all the resources of the largest excavating machinery manufacturer in the world, have been concentrated on giving you the best possible earning tool. If you're interested in a 2-yard shovel-dragline-crane, write for the new 44-B Bulletin and find out why it's far and away the top machine in its class.

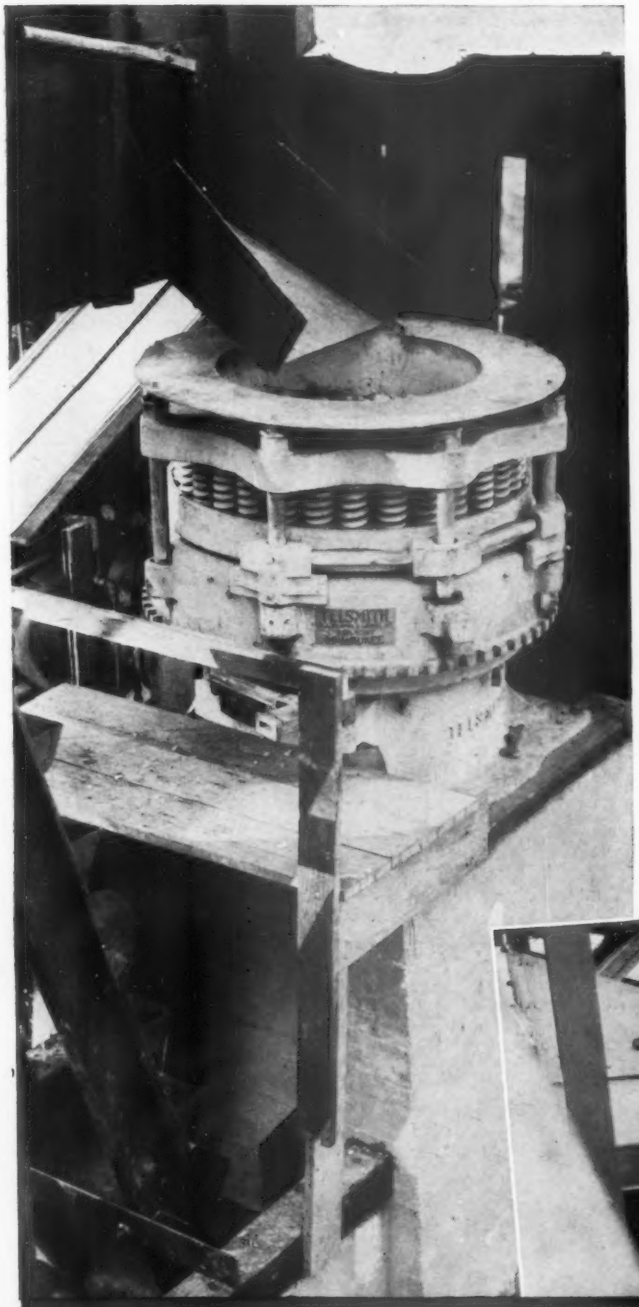
BUCYRUS ERIE

C 33

B·ucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

TELSMITH
is PROFIT EQUIPMENT
FOR THE MUSKOGEE GRAVEL COMPANY



● In a gravel plant, performance depends on equipment . . . profits depend on costs. The Muskogee Gravel Co., Muskogee, Oklahoma, has operated its Telsmith plant for over a year. "It has always performed satisfactorily in every way," says Manager A. O. Walker. "Maintenance has been at a minimum, and we are very well pleased with the operation and production costs.

"We are especially well pleased with the improved type Gyrasphere Crusher . . . it is showing very little wear or depreciation." This, in spite of a very wet feed—the supreme test of effective sealing and lubrication! For intermediate and fine crushing, it crushes faster, with less power, turning out larger tonnage and a finer product. Like a mortar and pestle . . . only inverted for easy discharge . . . the spherical head and its corresponding concave catch and break chunks of rock between two multi-curved surfaces—a perfect *cubing* action. *Write for free Bulletin Y-15.*

In this plant, a Telsmith Pulsator screens sand, gravel and crushed rock, wet or dry, and does it *right.* Its circular movement produces a maximum screening action that's *uniform* on every inch of the wire regardless of load. The toughest alloy steels, anti-friction bearings and special seal protection for working parts give it longer life and lower up-keep. *Get the details in free Bulletin Y-15.*

Telsmith complete pit or quarry plant service is described in *free Bulletin E-15.*

MC-11-39

SMITH ENGINEERING WORKS, 504 E. CAPITOL DRIVE, MILWAUKEE, WIS.

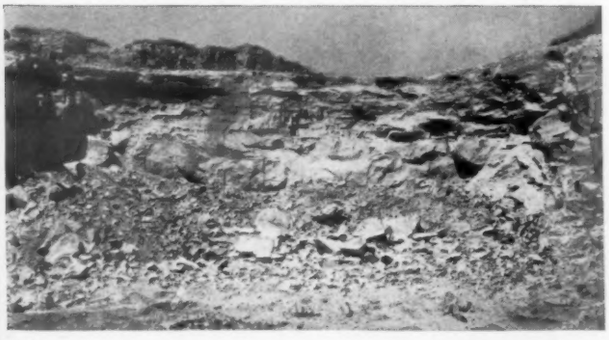
50 Church Street, New York City | 711 W. Walker Drive, Chicago, Ill. | 711 Commercial Trust Bldg., Philadelphia, Pa. | 21 Stacey Street, Cambridge, Mass. | 413 Wabashaw Bldg., Pittsburgh, Pa. | Brandt M. & S. Co., Louisville, Ky.

SHOWING *the* "MAN FROM MISSOURI"

. . . and the candid camera tells the story

1 In Klondike, Missouri, the Tavern Rock Sand Company was anxious to reduce blasting costs. They called in the Atlas representative, who recommended Atlas Apex—the new type quarry explosive. In October 1936, the first Apex "shot" was made. Tavern Rock has been a steady Apex user ever since.

2 Dramatic moment of an Apex blast at Tavern Rock. Plant Manager F. J. Ueltzen writes: "By using your Apex in these 'shots,' we find that we are getting very good results, mainly in lifting out the 'bottoms' and reducing secondary shooting to a minimum."



3 The result of an Apex blast—tons of rock ready for the shovel *at lower cost per ton*. Made in five grades—each with three velocities—Atlas Apex meets a wide variety of blasting needs. Let the Atlas representative arrange an Apex demonstration in *your* quarry!

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.
Boston, Mass.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Butte, Mont.	Kansas City, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Chicago, Ill.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Denver, Colo.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.

ATLAS

EXPLOSIVES

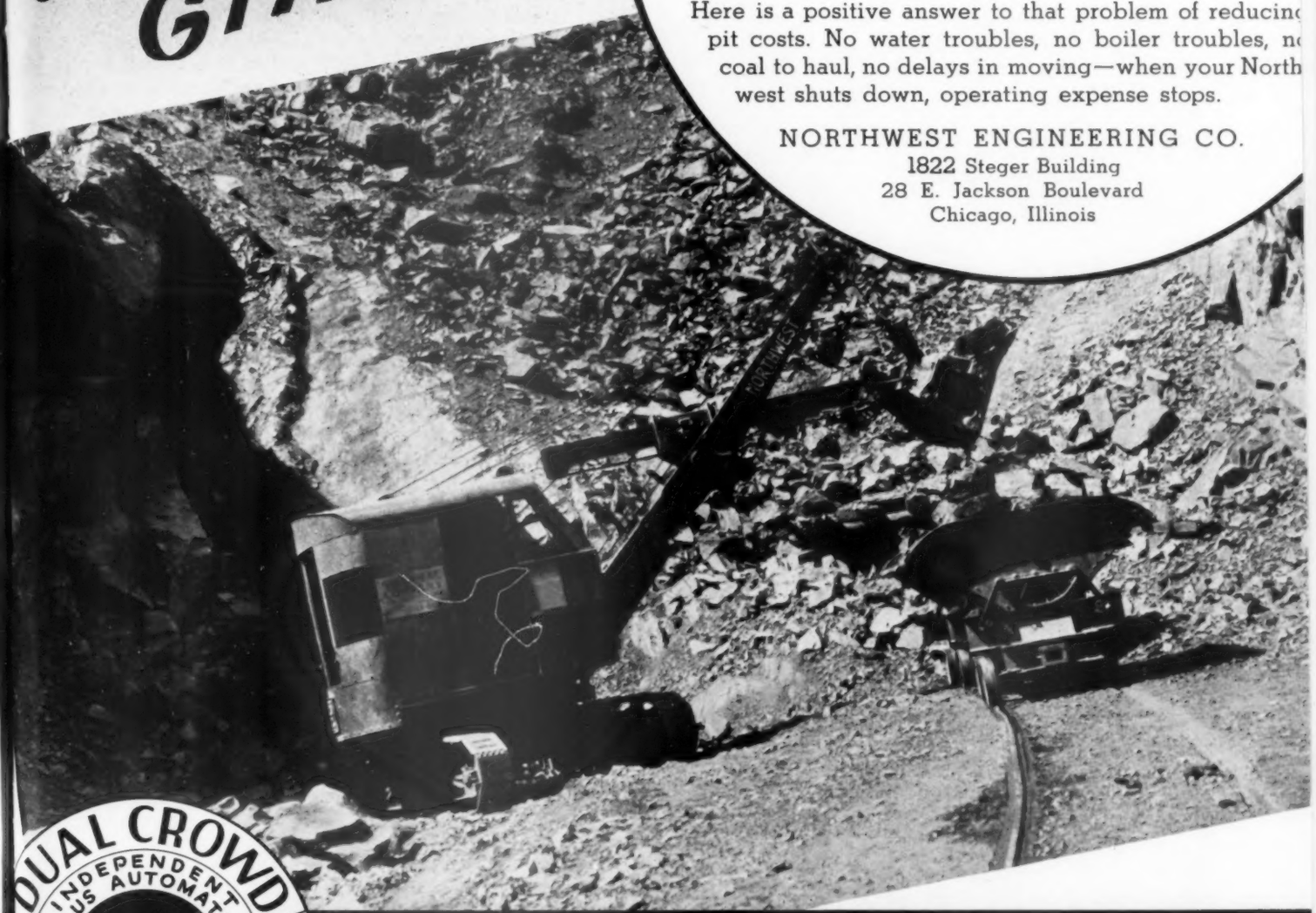
CHEMICALS ATLAS EXPLOSIVES

A Smaller NORTHWEST will do the work of many an old time GIANT!

TIMES change—and so does machinery. You fellows who are still using shovels 25 years old (don't smile—there are lots of them still in service) may not realize the possibilities for lower cost pit operations that are embodied in the smaller Northwests. They'll do the work of many an old time giant. These machines are rugged—cast steel bases with cast steel side frames assure the maintenance of shaft alignment and takes the shocks of rock digging. The Northwest Dual Crowd, automatic *plus* independent, assures a digging force that other shovels waste. Fast swing and easy mobility save time. The "feather touch" control makes possible easy operation and the Cushion Clutch reduces the stresses and strains on every part under power—and these are only a few features that make Northwests real rock shovels.

Here is a positive answer to that problem of reducing pit costs. No water troubles, no boiler troubles, no coal to haul, no delays in moving—when your Northwest shuts down, operating expense stops.

NORTHWEST ENGINEERING CO.
1822 Steger Building
28 E. Jackson Boulevard
Chicago, Illinois



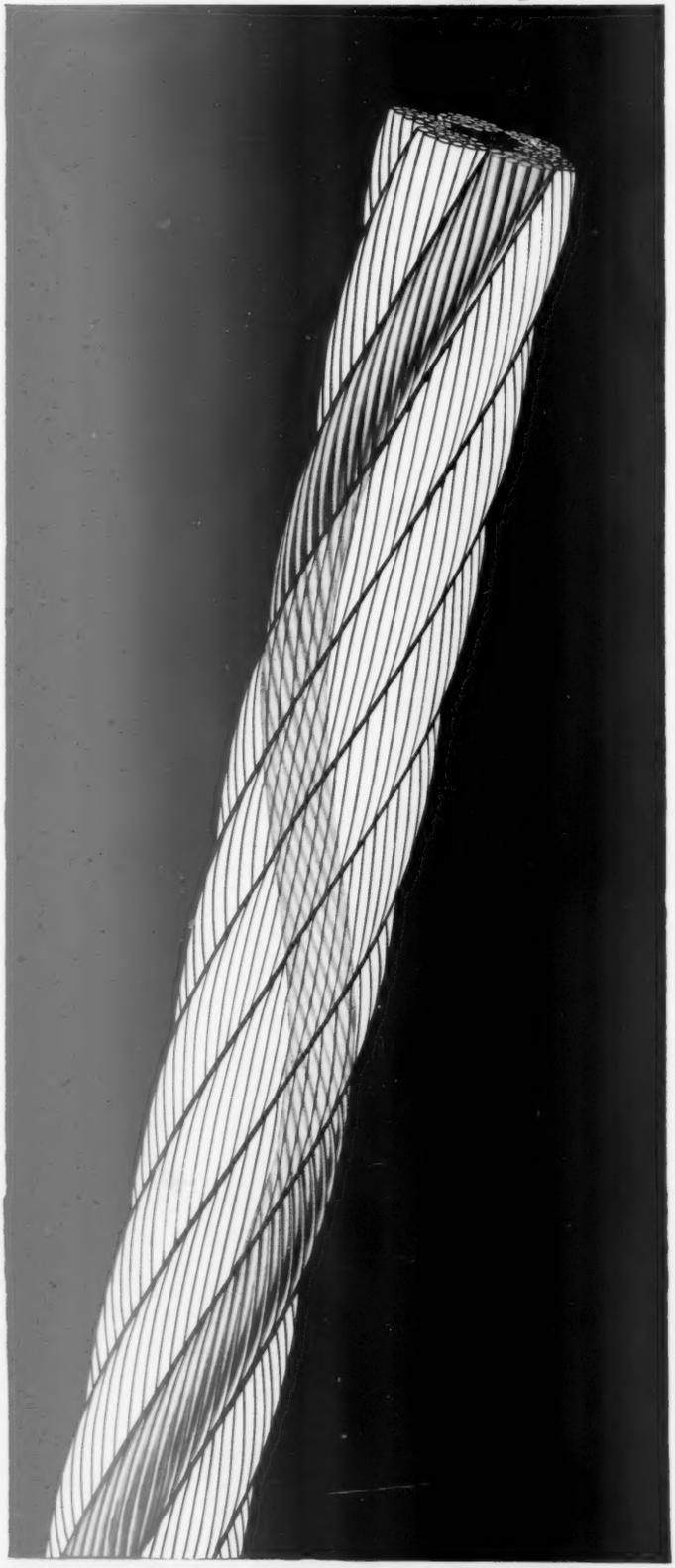
DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus

NORTHWEST

Shovels • Cranes • Draglines • Pullshovels • Skimmers

PURPLE-STRAND *FORM-SET* WIRE ROPE

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE



Here's what *FORM-SET* means

IN WIRE ROPE, individual wires and strands form a helical or screw pattern in the complete rope. Ordinarily these individual wires and strands are straight before entering the stranding and closing dies. They are forced into this helical shape and held there by seizing at the end of the rope. Remove this seizing, and strands fly apart from internal pressures.

By pre-forming rope, strands can be formed into this helical pattern before or during the closing of the rope. Individual wires are "set" in position at the same time. Result is a rope in which each wire and each strand lies in position without internal tension or pressure. Ends do not require seizing. The line might be termed "relaxed."

Form-Set is such a line. Strands have been preformed so that they are relaxed rather than being under spring tension. Not until the rope itself goes to work do the wires come under heavy stresses. As a result, the rope has greater fatigue life. It is easier to handle and break in. It spools better. It is less likely to kink. It resists whipping. Experience has shown that Form-Set gives more ton miles per dollar in spite of its somewhat higher first cost.

The combination of Form-Set construction and Purple-Strand quality gives you as fine a line as money can buy. It is built for the particular job and designed by men who know the conditions to be met. It is produced by a company which has spent three-quarters of a century making fine steel. For these reasons thousands of contractors consider Form-Set Purple Strand *the* line for heavy jobs.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

QUALITY IS CHARACTERISTIC OF ALL LIMA EXCAVATORS

When you own a LIMA, there is a satisfaction of knowing that you have a quality excavator designed to give the greatest value for your investment. LIMA excavators are dependable and will give years of profitable service in any kind of digging. Every feature has been proved; every piece of steel is especially treated for the work the part is to perform; every part that requires unusual strength is made oversize. From every viewpoint, LIMA shovels, draglines and cranes are quality machines, built to give maximum power at the dipper or bucket, greater fuel and lubrication economy and lower cost of up-keep. When you buy your next excavator, buy a LIMA and get quality performance.

LIMA

LIMA LOCOMOTIVE WORKS, Incorporated

Shovel and Crane Division LIMA, OHIO

NEW YORK 167th St. and Sedgwick Ave. | NEWARK, N. J. 317 Frelinghuysen Ave. | DALLAS 1304 McKinney Avenue | MEMPHIS 77 McCall Street | SAN FRANCISCO 235 Bayshore Boulevard

LOS ANGELES, 2001 Santa Fe Ave. SEATTLE 1932 First Ave. South

PHILADELPHIA, 1744 Sedgley Avenue

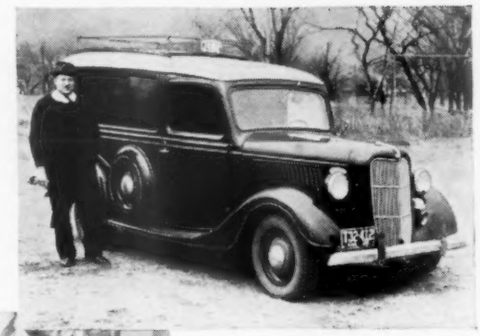
Tyee Machinery Company, Vancouver, B. C.

Convertible

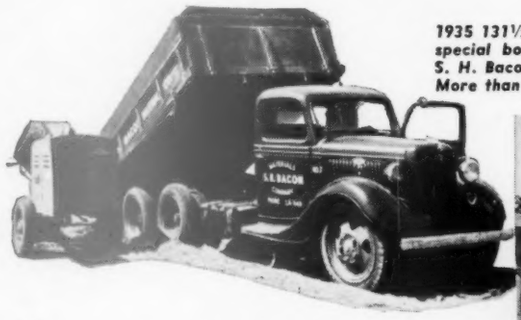
LIMA SHOVELS DRAGLINES and CRANES

80 TIMES AROUND THE WORLD

Below you see four Ford units with a combined mileage of more than 2,000,000 miles—about 80 times the distance around the world.



1936 112-inch Ford V-8 Panel, purchased in November, 1935, by Joy V. Thrash of Emporia, Kansas. Mileage now exceeds 508,000.



1935 131½-inch Ford V-8 Dump Truck with special body and trailing axle, owned by S. H. Bacon Co. of Los Angeles, California. More than 400,000 miles.

1934 Ford V-8 Tractor owned by C. E. Rimmer of Lodi, California. This truck is on the job 20 hours a day and has run over 600,000 miles.

1934 131½-inch Ford V-8 Tractor owned by Petroleum Carrier Corporation of Jacksonville, Florida. 626,000 miles and still going strong.

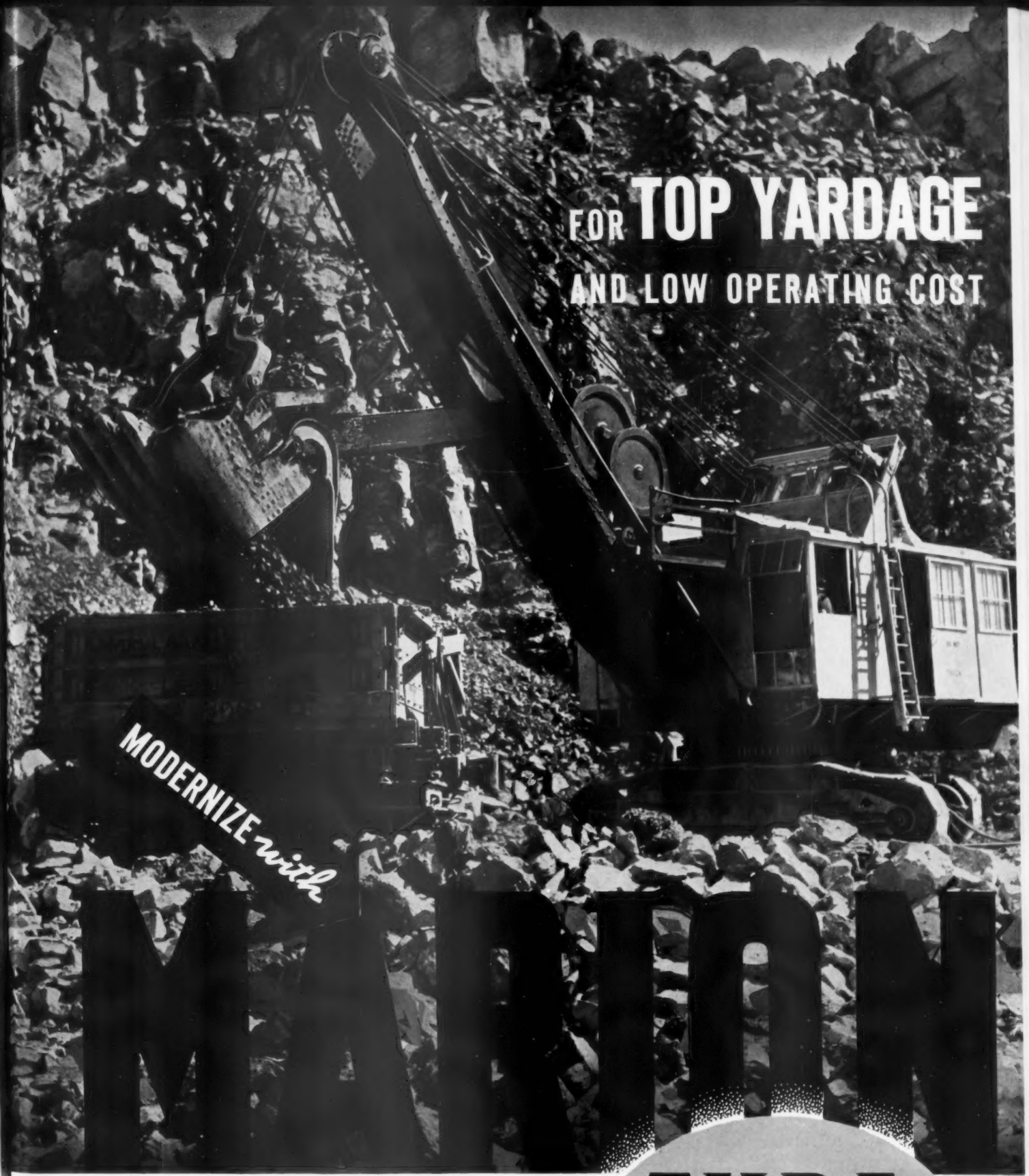
HERE is proof of spectacular truck performance. Not many trucks could do what these have done. Yet few Ford Truck owners will be surprised—even at this astonishing record. The man who owns or drives a Ford knows, better than any one, that for stamina and dependability it stands alone.

The units you see here, like all Ford Trucks and Commercial Cars, were built to the highest standards of quality in design, materials and workmanship. That, with the Ford Engine and Parts Exchange Plan, is the reason they were able to achieve their remarkable service record.

1939 Ford Trucks and Commercial Cars are better built than ever to give reliable, low-cost service over thousands of miles in every hauling and delivery field. There are 3 V-8 engines, 6 wheelbases, 42 body and chassis types (including cab-over-engine models) to choose from. See any Ford dealer for an "on-the-job" test.

Ford Motor Company, builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses.

FORD V-8 TRUCKS AND COMMERCIAL CARS



Here is a powerful MARION of 2-1/2 cubic yards capacity that is just the machine for those tough material handling jobs in open pit mining and quarries. It is built to Marion's rigid standards of sturdiness and strength . . . speed . . . low maintenance. Write for Bulletin 359 describing this machine in detail . . . or for information about other MARIONS for shovel, dragline, crane and clamshell service from 3/4 cubic yard up. » » » »

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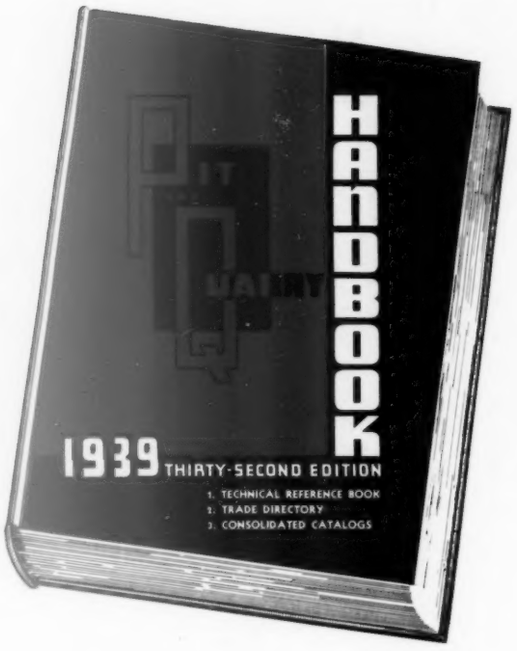

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. . . . Alphabetical, by Company Names →

National Portland Cement Co. PC
420 Bourse Bldg., Philadel[illegible] a, Pa.
W. M. Richards[illegible] B. Franks
(Bethlehem[illegible] gen. mgr.;
Geo[illegible] John Shibe,
tr[illegible]ethlehem, Pa.), gen.
su[illegible]achtmann (Bethlehem, Pa.),
ch[illegible]
Plant: Brodhead, Pa.

ALPHABETICAL

. . . . Geographical, by Plant Location →

BRODHEAD Northampton
(P. O. Bethlehem.)
National Portland Cement Co. PC
Branch of Philadelphia, Pa.
Plant Executives: H. [illegible]vendel, supt.; A. P. Hachtmann[illegible]. Franks, v.-pres., gen[illegible]ipment.
Pr[illegible]apacity: Portland ce[illegible]
Na[illegible] Deposit: Limestone. Stripping: Shovel. Drilling and Blasting: Blast hole drills. Digging and Loading: 2 P. & H. 2-cu. yd. electric shovels. Delivery to

GEOGRAPHICAL

Hundreds of New Names . . . Others Checked and Revised

The 1939 Directory section of Pit and Quarry HANDBOOK is the most complete ever published. It is up to the minute—as modern as skill and money can make it. It's checked and double checked. Copies are now available.

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Name ..... Title.....

Company .....

Town ..... State .....

CONVEYOR BELTS

by QUAKER

Typical installations showing views of Quaker conveyor belts that you will find in all parts of the country. Just the kind of belts that are used to convey sand, stone, gravel, crushed rock and kindred materials.

Quaker Belts are made for hard work. They have actual service built into them. This is made possible by the rigid selection of the raw material ... the building up of the proper rubber compounds and duck ... workmanship by skilled mechanics ... all under the supervision of experienced executives.

Quaker Belts stay on the job, no costly shut downs due to belt failure. Quaker Belts have what it takes to stand up and deliver volume tonnage at lower cost per ton conveyed. And the reputation gained by 53 years of business activity is back of every belt.

Before you need a belt, get in touch with Quaker ... give us your specifications. Let us submit our prices and samples.

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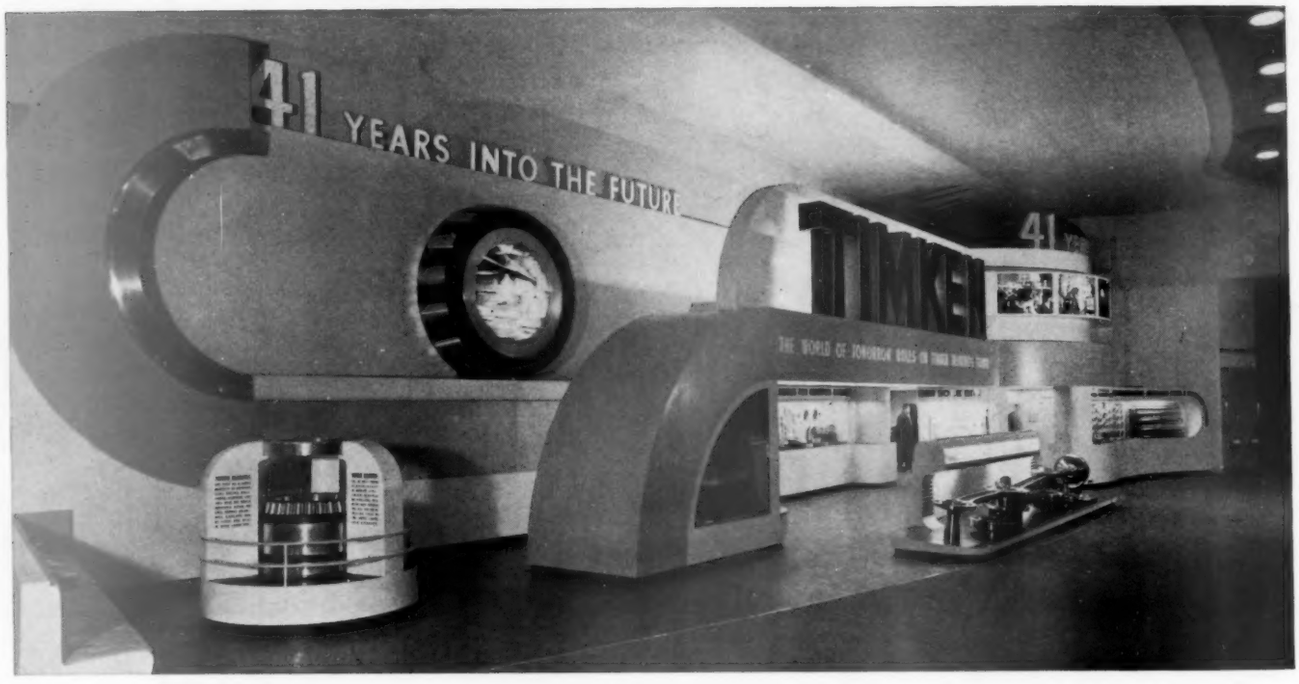

WITH TIMKEN AT THE NEW YORK WORLD'S FAIR

INTERESTING HIGHLIGHTS OF THE TIMKEN EXHIBIT

One of the first automobiles to be equipped with TIMKEN Bearings.

A TIMKEN Roll Neck Bearing having a load capacity of nearly three million pounds.

A machine that measures the thickness of a human hair in hundred-thousandths of an inch, as a demonstration of the precision with which TIMKEN Bearings are made.

A diorama showing in miniature the world's largest electric steel furnace—capacity 75 tons of steel per heat.

A TIMKEN Fuel Injection Pump cut away to show the internal mechanism in operation.

The various parts of a TIMKEN Bearing automatically assembling and disassembling to demonstrate the tapered design and construction of the TIMKEN Bearing.

A display dramatizing the Timken Roller Bearing Company's contributions to modern locomotive design—including TIMKEN Locomotive Bearings, main rods, side rods and other reciprocating parts.

And

THE TIMKEN ROLLER SKATERS in a sensational novelty act performed on a platform only nine feet in diameter elevated seven feet above the floor. The skaters perform ten times daily.

The exhibit of TIMKEN Products at the New York World's Fair has been acclaimed one of the outstanding features of this, the greatest show of all time.

Strikingly original in conception, wonderfully beautiful in its gorgeous color scheme and brilliant lighting effects, the Timken Exhibit emphasizes the keynote of the Fair "The World of Tomorrow" in a manner that captivates every visitor. But the Timken Exhibit has other claims to preeminence apart from its originality and beauty. Never before for example, has such a comprehensive display of bearings been seen in one place. Here are shown TIMKEN Bearings ranging from a few ounces in weight to one weighing more than *three tons;* bearings for every possible application in industry and transportation—from automobiles to railroad trains and from precision machine tools to huge steel rolling mills.

Equally impressive are the displays of other TIMKEN Products; including TIMKEN Alloy Steels, TIMKEN Alloy and Carbon Steel Seamless Tubing, TIMKEN Rock Bits, and TIMKEN Fuel Injection Equipment for fuel oil burning engines.

Nor is novelty lacking, for as a demonstration of the precision with which TIMKEN Bearings are made there is a machine capable of measuring the thickness of a human hair in hundred-thousandths of an inch! Visitors can measure their own hair on this machine and keep the measurement records for souvenirs. Naturally this is one of the most popular spots in the entire Fair.

All in all the Timken Exhibit is a truly remarkable achievement—an attraction no visitor can afford to miss. You will find it in the Metals Building adjacent to the Trylon and Perisphere.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

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PIT AND QUARRY

Vol. 32 July, 1939 No. 1

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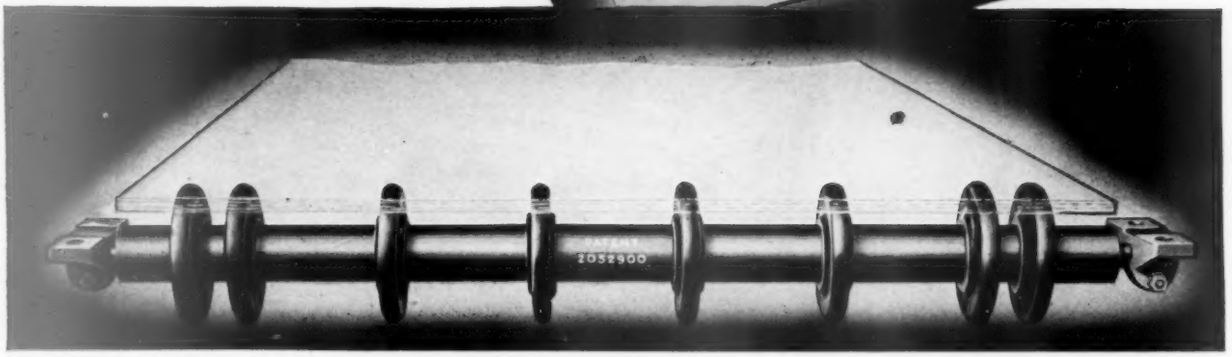
MEMBER AUDIT BUREAU OF CIRCULATIONS

RUBBERDISC
RETURN IDLER

FOR BELT CONVEYORS

NO LUBRICATION
LESS POWER
SELF CLEANING
RESISTS ABRASION



THE RUBBERDISC Return Idler is ideal for use on conveyor belts handling abrasive, corrosive, damp, or somewhat sticky material.

It is constructed of a steel tube shaft on which is mounted a series of resilient rubber discs spaced as shown in the picture.

Within the steel tube are ball bearings completely sealed and lubricated for life. No greasing or oiling is required.

Due to the light weight of the idler and the type of bearings used it turns very easily. Slippage is thus avoided and the conveyor operates with a minimum of power.

The resilient and flexible discs and the open construction, with the belt supported at only a few points instead of its full width, makes this a self-cleaning idler. The slight flexing of the belt and the rubber discs also has an effective cleaning action on the belt. Conveyed material cannot build up on this idler.

Abrasion of both belt and idler is greatly reduced because there is much less wear in a rubber-to-rubber contact than in rubber-to-metal.

The answer to your problem of return idler maintenance, and dirty belts, is the ROBINS RUBBERDISC IDLER.

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PIT AND QUARRY

CHICAGO

JULY, 1939

Kaiser Gets Cement Job; to Build Plant

DAM AGGREGATE BIDS OPENED

On June 10, the Procurement Division of the Treasury awarded an $11,025,892 contract to the Permanente Corp. of Simla, Cal., to furnish 5,800,000 bbl. of low-heat Portland cement over a 4-yr. period for use in the Shasta Dam of the Central Valley Project in California. The cement is being supplied at a delivered cost to the government of $1.90; Permanente's bid f.o.b. mill was $1.19. The Permanente Corp. is building a new plant to fulfill the contract, and the award was held up for some weeks while a decision was reached as to whether this arrangement is legal. A syndicate of six cement companies had submitted a joint bid 25c. to 45c. higher than Permanente's, depending on the rate of delivery.

The bids were opened May 1, but had been held up by a protest from some producers that the Permanente Corp. had no plant with which to produce the cement. The concern recently won permission from the Santa Clara County Board of Supervisors to erect a $4,000,000 plant in the Los Altos hills, and government officials said that a satisfactory showing had been made that the plant would be in operation in time to make delivery on the contract date of March 1, 1940.

The successful corporation was organized by Henry J. Kaiser, San Francisco contractor and aggregates producer.

The Permanente Corp. plant, now under construction 40 mi. south of San Francisco, will have a daily capacity of 7,000 bbl. of low-heat cement. Orders for most of the equipment have been placed, and the plant will be in operation prior to January 1, 1940.

Bids were also opened June 9 by the Bureau of Reclamation for furnishing 10,200,000 tons of sand and gravel for use at Shasta Dam. Three bids were submitted on the basis of using a gravel deposit at Redding, Cal., of which the lowest was $4,414,000, submitted by the Columbia Construction Co.

On the basis of using a deposit near Cottonwood, the Redding Trading Corp. offered the low bid of $4,542,000. In addition to the amount of the bid, the award of the contract will be influenced by the cost to the government of acquiring gravel rights, rights-of-way for railroad spurs, and the cost of transportation. Unit prices on the aggregate vary from 42c. to 53c. a ton for gravel and from 36c. to 53c. a ton for sand.

LIME ASSN. MEETING REPORT IN AUGUST

Lack of space in this issue makes it impossible for the inclusion of the report of the annual convention of the National Lime Assn., held June 1 and 2 at Hot Springs, Va. Look for it in PIT AND QUARRY for August.

Southeastern Lime Men Form Institute

The Southeastern Lime Institute, Inc., an organization devoted to "the promotion of interest in lime and kindred materials and for rendering services of an educational nature with respect to its proper use," has been formed by southern lime manufacturers with headquarters at Knoxville, Tenn.

Hal Covert, of Knoxville, is secretary-treasurer and general manager. E. L. Osborne, Knoxville Lime Mfg. Co., is president and E. S. Ginnane, Cheney Lime & Cement Co., S. C. Snead, Kimbalton Lime Co., and W. H. Palmer, Dixie Lime Products Co., are vice-presidents.

The Independence Sand & Gravel Co., Independence, Ore., has opened a branch plant at McMinnville, Ore. Wallie Ruth of Eugene is manager of the new branch according to Claude Skinner, vice-president and manager of the company.

May Construction Is Highest Since 1930

GAINS 9% OVER LAST YEAR

New construction and engineering work undertaken during May attained the highest level for any May since 1930. Total contracts for May, 1939, amounted to $308,487,000 for the 37 eastern states, according to the F. W. Dodge Corp. This total represents a gain of 9 per cent. over May of last year, but shows a decline of 7 per cent. from April of this year.

The most significant development in the May contract record occurred in private construction which has shown marked increases since the beginning of this year. Privately-owned construction for May totaled $173,730,000, which was 25 per cent. ahead of last year and 2 per cent. above the April, 1939, figure. For the first five months of this year, this class of construction is 36 per cent. ahead of the same period last year. With the final passage of the amendments to the National Housing Act, the confusion and uncertainty existing this spring should now permit private construction to proceed at a pace well ahead of last year.

Further evidence of the generally firm tone to the private construction record during the past few months appears in the increasing proportion which this class has contributed to the total construction record. In January, for example, private work represented only 41 per cent. of total construction; in February the proportion rose to 50 per cent.; while for May, private work contributed 56 per cent. of all construction. For May of last year only 49 per cent. of all construction represented private work.

May contracts for total building, comprising residential and non-residential work, amounted to $210,567,000 as compared with $209,061,000 for April and $160,924,000 for May of last year. Contemplated projects for all classes of construction totaled $414,486,000 for May.

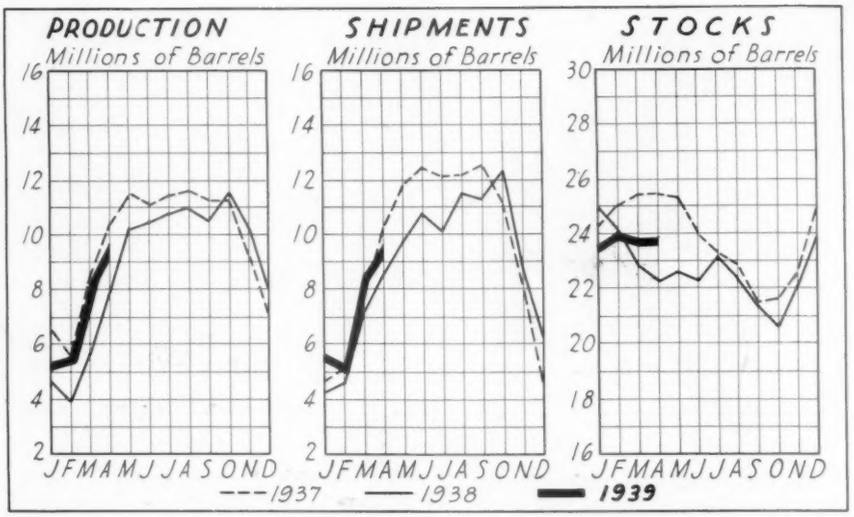
Rulings on Marine and Truck Workers

ADMINISTRATOR CLARIFIES ACT

Several member companies raised with the National Sand & Gravel Assn. the question as to the extent of application of the Walsh-Healey Act to employees of sand-and-gravel companies using navigable waters either for production or transportation, or both. The Act itself did not seem to be plain on this point and no definite answer could be obtained from official regulations issued by the Division of Public Contracts of the U. S. Department of Labor. Accordingly Executive Secretary V. P. Ahearn presented the question for a ruling from L. Metcalfe Walling, Administrator of the Act, in which the position is taken that "marine workers on barges such as barge captains or on dredges out of touch with the shore for periods in excess of 24 hours will not be regarded as subject to the Act." Mr. Walling holds that employees who go aboard the dredge daily from the shore and return at night to the shore are subject to its provisions, the time of such employees being deemed to commence at the period when they are required by the company to report for work.

Important questions have also been raised as to how far the Walsh-Healey Public Contracts Act extends in the case of contracts executed by producers which call for delivery of the materials to an agency of the Federal government, and where the transportation medium is trucks, the ownership of which falls into three classes: (1) trucks owned by the producing company; (2) owner-operator trucks; and (3) trucks owned by bona fide trucking contractors.

Mr. Walling also clarified the Act in respect to these three types of employees. He holds that where a producer signs a contract for delivery of materials to the government in which truck transportation is involved and in which the trucking is done by bona fide trucking contractors, the employees of that bona fide trucking contractor are not subject to the Act; but that owner-operators of trucks and drivers of trucks owned by the producing company would be subject to the Act.



The Portland-cement industry in April, 1939, produced 9,674,000 bbl., shipped 9,654,000 bbl. from the mills, and had in stock at the end of the month 23,806,000 bbl., according to the Bureau of Mines. Production and shipments of Portland cement in April, 1939, showed increases of 21.2 and 11.1 per cent., respectively, as compared with April, 1938. Portland-cement stocks at mills were 6.9 per cent. higher than a year ago. The mill value of the shipments (19,151,000 bbl.) in the first quarter of 1939 is estimated as $28,168,000. According to the reports of producers the shipments totals for the quarter include approximately 818,000 bbl. of high-early-strength Portland cement with an estimated mill value of $1,528,000.

Prof. Carlson Awarded Charles Dudley Medal

For his paper presented at the 1938 annual meeting of the American Society for Testing Materials on the subject *Drying Shrinkage of Concrete as Affected by Many Factors,* R. W. Carlson, associate professor of civil engineering, Massachusetts Institute of Technology, has been awarded the A.S.T.M. Charles B. Dudley Medal. This medal, which commemorates the name of the first president of the Society, is awarded to the author of the paper which is of outstanding merit constituting an original contribution on research. The award was made on June 28, at the 1939 A.S.T.M. annual meeting in Atlantic City.

The committee in charge of selecting the Medalist selected Mr. Carlson's paper "for able work in developing a simple logical theory of concrete shrinkage, in testing that theory by a series of carefully planned experiments, and in presenting the results in a clear and convincing manner in his paper. It is the belief of the committee that he has made a real contribution to the knowledge of concrete as a building material, which should prove valuable in the rational design of concrete structures."

Golden Gate-Atlas Co., Subsidiary, Dissolved

Pacific Coast Aggregates, Inc., San Francisco, Cal., has dissolved its subsidiary, the Golden Gate-Atlas Materials Co., in which the parent company owned 98 per cent. of the outstanding stock.

The company acquired from the Golden Gate-Atlas Materials Co. all the latter's assets for the sum of $42,895 and assumed all debts and liabilities. After dissolution of the subsidiary, net proceeds of the sale were distributed to its stockholders as their interest appeared.

Colorado Gravel Firm Adds New Truck-Mixers

The Fountain Sand & Gravel Co., Fountain, Colo., has added new 1½-cu. yd. Smith-Mobile truck mixers for handling its "Red-E-Mix" concrete. The company is one of the ready-mixed-concrete pioneers in Colorado, having been in this branch of the business for over 11 years. The trucks just added are Ford cab-over-engine models.

Recent Equipment Installations ★ ★ ★

The Campbell Limestone Co., Gaffney, S. C., has just installed a new Day pulverizer. . . . *Stearns concrete-block machinery is being installed by the Clark Concrete Const. Co., Idaho Falls, Ida.; Cement Products Co., Mansfield, O.; Rockford Cement Products Co., Rockford, Ill.; Fairbank Block & Supply Co., Toronto, Ont.; and Clyde Cox, Hemlock, Mich.* . . . A Pioneer double-deck screen has recently been placed in service by Jeffries & Betts, sand-and-gravel producer at Fort Worth, Tex.

An International 65-hp. gasoline engine has been installed by Ray Hooten at his gravel plant at Greenfield, Ind. . . . *The Southwest Stone Co., Dallas, Tex., recently installed an Allis-Chalmers 4-ft. by 12-ft. triple-deck low-head vibrating screen complete with 10-hp. motor and Texrope drive.* . . . Three new Concrete Transport Mixer Co. trucks have gone into service at the ready-mix plant of the Springfield Quarry & Concrete Co., Springfield, Mo.

The Valley Dolomite Corp. has just installed a 150-ft. Allis-Chalmers rotary kiln at its Bonne Terre plant.

RECENT GOVERNMENT CONTRACTS FOR MATERIALS UNDER THE PUBLIC CONTRACTS (WALSH-HEALY) ACT

Date of Delivery 1939	Source of Supply	Government Agency	Commodity	Amount
6/30/40	Southern Materials Corp., Norfolk, Va.	Norfolk Navy Yard	Ready-mixed conc.	$52,005.00
Indef.	Santa Cruz Portland Cement Co., San Francisco, Cal.	Treas., Proc.	Portland cement	Indefinite
Indef.	Oregon Portland Cement Co., Portland, Ore.	Treas., Proc.	Portland cement	Indefinite
7/9	John P. Callaghan, Inc., Harrison, N. J.	WPA Treas., Proc.	Ready-mixed conc.	16,410.00
5/13	Carnegie-Illinois Steel Corp. Youngstown, O.	WPA, Treas., Proc.	Slag	21,027.29
12/31	Basic Dolomite, Inc., Cleveland, O.	Agriculture	Grd. limestone	Indefinite
12/31	The National Lime & Stone Co., Findlay, O.	Agriculture	Grd. limestone	Indefinite
Indef.	Monolith Portland Midwest Co., Denver, Colo.	Treas., Proc.	Portland cement	Indefinite
Indef.	The Colorado Portland Cement Co., Denver, Colo.	Treas., Proc.	Portland cement	Indefinite
6/30	Monolith Portland Cement Co., Los Angeles, Cal.	WPA, Treas., Proc.	Cement	25,595.20
9/1	North American Cement Corp., Alsen, N.Y.	Panama Canal	Portland cement	49,000.00
6/30	Ash Grove Lime & Portland Cement Co., Louisville, Neb.	WPA, Treas., Proc.	Portland cement	Indefinite
6/30	Nebraska Cement Co., Superior, Neb.	WPA, Treas., Proc.	Portland cement	Indefinite
6/30	Dewey Cement Co., Dewey, Okla.	WPA, Treas., Proc.	Portland cement	Indefinite
6/30	Lone Star Cement Co., Bonner Springs, Kan.	WPA, Treas., Proc.	Portland cement	Indefinite
6/30	Missouri Portland Cement Co., Sugar Creek, Mo.	WPA, Treas., Proc.	Portland cement	Indefinite
12/31	Pennsylvania-Dixie Cement Corp., N.Y.City.	Navy, S&A	Portland cement	Indefinite
12/31	Medusa Portland Cement Co., Cleveland, O.	Navy, S&A	Portland cement	Indefinite
12/31	Universal Atlas Cement Co., Hudson, N. Y.	Navy, S&A	Portland cement	21,586.00
12/31	Coplay Cement Mfg. Co., Saylor, Pa.	Navy, S&A	Portland cement	Indefinite
12/31	Lehigh Portland Cement Co., Allentown, Pa.	Navy, S&A	Portland cement	Indefinite
12/31	Alpha Portland Cement Co., Easton, Pa.	Navy, S&A	Portland cement	13,000.00
6/30	Basalt Rock Co., Inc., Napa, Cal.	WPA, Treas., Proc.	Ready-mixed conc.	14,400.00
7/31	Colonial Sand & Stone Co. Inc., Astoria, L. I.	WPA, Treas., Proc.	Ready-mixed conc.	71,500.00
4/30	Michigan Limestone & Chemical Co., Detroit, Mich.	WPA, Treas., Proc.	Crushed stone	10,750.00
5/5	Michigan Limestone & Chemical Co., Detroit, Mich.	WPA, Treas., Proc.	Crushed stone	12,540.00
8/1	Tennessee Products Corp., Nashville, Tenn.	TVA	Rock phosphate	12,300.00

McCarthy New President of Pacific Portland

By a vote of 71,728 to 60,929, stockholders of the Pacific Portland Cement Co. upheld the administrative policies of the directorate group headed by William F. Humphrey and J. A. McCarthy at a meeting held in San Francisco in June. Mr. McCarthy was elected president, replacing R. B. Henderson, who has been inactive for some time because of poor health.

The opposition was led by John D. McKee, and aligned with him, among others, was Herbert Fleishhacker.

Disagreement between the two factions grew out of capital-reorganization proposals one of which, capital reduction, became effective as of June 30, 1938. The other, after having been in the hands of a special committee, was dropped from consideration.

U. S. to "Crack Down" on Building Industries

Asserting that "unreasonable restraints of trade are . . . the most conspicuous reason for high construction costs," Thurman W. Arnold, assistant attorney-general of the United States has revealed that the Department of Justice proposes to proceed against all phases of the building industries in a sweeping investigation in respect to enforcement of the anti-trust laws.

Producers of materials, according to Mr. Arnold, have fixed prices by private or trade-association arrangements. He has also accused them of using basing-point systems, zone-price systems, merging competing enterprises, etc.

Distributors, contractors and building-trades unions are also accused of maintaining unreasonably high prices through monopolistic conspiracies, collusive bidding, and "strong-arm" methods.

Honor Dr. Sappington for Medico-Legal Work

At the recent convention of the American Assn. of Industrial Physicians and Surgeons in Cleveland, O., Dr. C. O. Sappington of Chicago was named winner of the W. S. Knudsen Award for the most outstanding contribution to industrial medicine during 1938-39. The award was made on the basis of Dr. Sappington's new book *"Medicolegal Phases of Occupational Diseases."*

Dr. Sappington is nationally known for his consultant work with industrial concerns. He has written a number of special articles for PIT AND QUARRY.

Coming Events

July 20, 1939 — Rye, N. Y. Mid-summer meeting, Board of Directors, National Crushed Stone Assn., Westchester Country Club.

July 27 and 28, 1939 — San Francisco, Cal. Mid-summer meeting, Board of Directors, National Sand & Gravel Assn., Palace Hotel.

October 16-20, 1939 — Atlantic City, N. J. National Safety Congress and Exposition.

Notable Advance in Mine, Quarry Safety

INLAND PLANT TOPS LIST

Notable records achieved by mines and quarries in the prevention of accidents among mineral workers were recognized in the announcement of the winners in the National Safety Competition of 1938 made recently by Dr. John W. Finch, director of the Bureau of Mines.

Three hundred and forty-five mines and quarries operating in 37 states participated in this, the 14th, annual safety contest conducted by the Bureau of Mines.

Four underground mines, one open-cut mine and one quarry, each a leader in its group, were awarded the "Sentinels of Safety" trophies, donated by the *Explosive Engineer* magazine. Relative standing in the contest was based on the number of days lost from accidents in proportion to the total number of man-hours worked.

The winner of the trophy in the non-metallic mineral mine group was the Avery salt mine of the Avery Salt Co. at Avery Island, La. This mine worked 272,766 man-hours in 310 days without a lost-time accident.

Among the quarries, the winner was the Port Inland, Mich., limestone quarry, operated by the Inland Lime & Stone Co. The quarry is located in Mackinac County and the crushing plant in Schoolcraft County, Michigan. This quarry worked 299,751 man-hours in 206 days without a lost-time accident.

Waco Plant Rededicates P.C.A. Safety Trophy

At the Waco, Tex., plant of the Universal Atlas Cement Co. ceremonies were held on June 7, rededicating the Portland Cement Assn. safety trophy awarded for achieving the perfect safety record of completing the calendar year of 1938 without a lost-time accident. This record actually extended from August 5, 1937, to May 3, 1939, a total of 635 days, nearly two years.

From April 28, 1935, to August 4, 1937, the plant operated for 830 days, or over 2 years, without an accident. This included the entire calendar year of 1936 when the plant was originally awarded the safety trophy.

Mayor T. M. Gribble of Waco made the principal address. Other speakers were J. A. Thomas, assistant industrial relations manager, C. A. Wallerstedt, superintendent, and Ben McCrum, safety director of the Waco plant. Music was furnished by the North Junior high school band which recently won national honors.

Important Ruling on Damage from Blasts

NEWCOMERS ENTITLED TO RELIEF

Persons who move into a neighborhood where a quarry has been operating for years are nevertheless entitled to relief if the conduct of the business constitutes a nuisance, according to the New Jersey Chancery Court.

Such an interpretation was made by Vice Chancellor Alfred A. Stein in an opinion handed down at Newark, N. J., May 18, explaining why a month earlier he temporarily restrained the Kernan Quarry, South Orange, from blasting heavily enough to cause vibration or damage to nearby residences.

The defense had argued that most of the 48 residents and property owners who were complainants had moved to the section in 1931, after the quarry had been operating there for years.

Judge Stein quoted with approval an old case which stated: "If population, where there was none before, approaches a nuisance, it is the duty of those liable at once to put an end to it. It would be most inconsiderate to hold that having submitted for some years they must patiently submit so long as the defendant sees fit to impose upon them. Every day's continuance is a fresh nuisance."

The court added: "If the business of defendants can not be operated without causing vibration resulting in damage to the property of complainants, there is no right in defendants to continue their business."

The complainants alleged walls and foundations were cracked by the blasts. One woman claimed her eardrums were injured by the explosions.

P.C.A. Specifications for Concrete Houses Issued

Illustrated specifications are being prepared by the Portland Cement Assn. to help architects and builders write specifications for concrete houses. Drawings, pictures and explanatory notes distinguish these from ordinary specifications and emphasize important details of construction. Published in 8½-in. by 11-in. loose-leaf form, the specification series when complete will constitute a construction manual especially helpful to builders.

The first three specification leaflets now available on request are:

1. *Precast Joist Concrete Floors with Cast-in-Place Concrete Slabs*—A specification for contractors, architects, concrete products manufacturers building this low cost, firesafe type of residence floor.

2. *Portland Cement Stucco on Concrete Masonry Walls*—The strength, beauty, weather and fire resistance of portland cement stucco is fully realized with good materials and good workmanship. This specification tells how to do the job right on walls ideally suited to stucco—concrete masonry.

3. *Application of Portland Cement Paint on Exposed Concrete Masonry Walls*—As a decorative and waterproofing treatment of exposed concrete masonry, a portland cement base paint, when properly applied and cured, will give many years of satisfactory service.

N. J. Commission Without Power to Order Cut

The New Jersey Public Utilities Commission on June 10 dismissed a complaint of the New Jersey Pulverizing Co., charging discrimination by the Central Railroad of N. J. in levying a rate of $1.32 per net ton for unground sand shipped in open cars from Pinewald, N. J., to the plant of the American Radiator Co. at Bayonne. The rate for similar shipments by way of the Pennsylvania Railroad from Toms River, 6 mi. from Pinewald, is $1.10 a ton, it was brought out.

Although admitting the pulverizing company is placed at a disadvantage by agreements between the Pennsylvania and Lehigh systems, the commission held it lacks authority to compel the Central Railroad to make a similar agreement with the Lehigh Valley.

Cement Industry Ends No-Accident Campaign

For the thirteenth time in 15 years, the entire Portland-cement industry in the United States and Canada, during the month of June participated in a special campaign to eliminate occupational injuries.

The drive is sponsored annually by the Portland Cement Assn. Preparations were begun in April when every employee pledged himself to make extra efforts to avoid personal injury.

Only 19 workmen were injured during the campaign last year throughout the industry. An all-time low in injuries was reached in June, 1935, when only 11 accidents were reported.

Fire Damages Indiana Crushed-Stone Plant

Part of the plant of the Hostettler Crushed Stone Co. near Bedford, Ind., was destroyed by fire recently causing an estimated $5,000 loss.

Included in the equipment destroyed was an air compressor and several electric motors. About 50 lb. of explosives also burned.

Excess Chert Causes Friction in Indiana

OPPOSE NEWEST SPECIFICATIONS

Too much chert in gravel taken from Indiana pits is causing a row over highway materials at Indianapolis, Ind., according to the *Indianapolis Star*.

T. A. Dicus, highway-commission chairman, said engineers recently put in concrete-road specifications a clause that will prohibit the use of gravel having a chert content of more than 5 per cent.

Sand-and-gravel operators have criticized the Commission for what they termed discrimination against their gravel.

"We are not necessarily rejecting Indiana gravel but are trying to control materials that go into state roads to insure better highways in the future," Mr. Dicus said.

"Engineers claim that the chert will pop out of the pavement in freezing and thawing weather. Many of the chipped-out holes in pavements were attributed to the use of chert."

"It's just a revival of the old battle between the gravel and crushed-stone people," Mr. Dicus said. "This job of trying to run a highway department is nothing short of a nightmare. If it isn't a row over gravel and stone it's a quarrel over the use of 'black top' in preference to concrete. Nobody ever is satisfied with anything."

Indiana built more miles of bituminous ("black-top") highways than any other state last year, according to figures published by the American Assn. of State Officials.

Spending $100,000 on Rock-Wool Operations

Approximately $100,000 is being spent by the American Rock Wool Co. in an improvement program at its mineral-wool plant at Wabash, Ind.

All structural and sheet-steel work on the new warehouse and machine-shop buildings is being done under contract by Hetherington & Berner, Inc., of Indianapolis, Ind.

Earlier this year the company built a warehouse to replace one destroyed by fire a year or more ago.

Acquires Plant, Assets of Le Grand Limestone

Assets of the Le Grand Limestone Co., including plants at Lake View, Ia., have been acquired by the Hallett Construction Co. of Crosby, Minn.

The new owners will continue to operate under the new name of the Lake View Gravel Co.

Lime-Container Rule Again Under Fire

QUICKLIME CALLED HAZARDOUS

Lime manufacturers may recall that on August 24, 1934, the Interstate Commerce Commission released its Regulations 3666 (effective February 1, 1935) governing the transportation of explosives and other dangerous articles on freight and freight-and-passenger vessels, and that these regulations originally prohibited the use of wooden barrels, asphalt-lined multiwall paper bags, and asphaltic paper-lined jute or burlap bags for the transportation of quicklime.

As these proposed regulations would have imposed a severe hardship upon those manufacturers who were engaged in shipping quicklime for coastwise trade in waterproof bags and wooden barrels, the National Lime Assn., with the coöperation of lime manufacturers, bag manufacturers, and others, presented data to the I.C.C. and requested that the proposed regulations be amended to remove the features which threatened to destroy a marketing practice theretofore satisfactory to manufacturers, shipping agents, and consumers. The association's efforts in this direction were successful, with the result that up to the present time the I.C.C. Regulations have permitted water shipments of quicklime (classified as a semi-hazardous material) packed in metal drums, tight wooden barrels, asphalt-lined multiwall paper bags, asphaltic paper-lined jute or burlap bags, and wooden or fiber-board boxes.

Now comes the first preliminary draft of proposed rules and regulations governing the transportation, storage and stowage of explosives and other dangerous articles on board vessels, issued by the Bureau of Marine Inspection and Navigation of the U. S. Department of Commerce. Under these proposed regulations the only containers permitted for the shipment of quicklime or calcium oxide on freight vessels, passenger vessels, ferry vessels, and railroad car ferries are tight metal barrels or drums, tight wooden barrels, and wooden boxes. Here again quicklime is classified as a semi-hazardous material.

Similar Bureau regulations covering the water shipments of quicklime have been in effect since 1917, despite the fact that the I.C.C. has permitted the use of the paper and cloth bags mentioned above. It is understood that, in the event of legal difficulties, the regulations of the Bureau would prevail over those promulgated by the I.C.C. The Bureau now is undertaking an extensive study of the whole subject of containers for the water shipment of dangerous or hazardous commodities with the I.C.C. coöperating.

Ohio, Kentucky Plants Erect Concrete Bins

In May of this year the Central Silica Co., Glass Rock, O., installed two 20-ft. by 60-ft. Marietta concrete bins for the storage of dry silica sand. Haydite staves were specified because of their unusual thermal insulating qualities. Bins are equipped with tunnels at box-car-floor level so that the box-car loader used can be readily moved from bin to bin. The River Sand & Gravel Co. of Owensboro, Ky., has just installed two 18-ft. by 40-ft. Marietta concrete bins for storing concrete aggregate. This was a step in thoroughly modernizing this Ohio River plant. Several additional bins and an improved conveying system are contempleted. It will ultimately make this plant one of the best equipped of its kind.

Income and Pay-rolls Show Definite Gains

Income payments to individuals in the United States during the first quarter of 1939 aggregated $16,105,000,000, representing an increase of 2 per cent. over the aggregate of $15,788,000,000 for the corresponding period of 1938, according to the Department of Commerce.

Income payments, as measured by the monthly series of the Bureau of Foreign and Domestic Commerce, comprise wages, salaries, dividends, interest, entrepreneurial income and relief payments.

Income received by employees during the first quarter of 1939 was 4 per cent. above the total for the corresponding period a year ago. Aggregate pay rolls in the commodity producing industries (mining, manufacturing and construction) were 7 per cent. higher than in the first quarter of 1938.

Installs Concrete-Stave Plant at Boonville, Mo.

A fourth plant for the manufacture of concrete-silo staves is being established at Boonville, Mo., by the Interlocking Stave Silo Co. of Wichita and Topeka, Kan. The company has been in business since 1911 and has plants for the manufacture of the staves at Enid, Okla., as well as in Wichita and Topeka.

Leo Andrews is supervising construction and the installation of machinery. Kent Merry is president of the concern.

Set Concrete-Pouring Record at Coulee

PLACE 20,684 YD. IN DAY

A record which construction men believe will stand unchallenged for a long time was set May 25 when crews of Consolidated Builders, Inc., placed 20,684 cu.yd. of concrete in Coulee Dam. Average production was 1 cu.yd. of concrete every 4.18 sec., or 861 cu.yd. per hr.

The record is almost twice the highest daily pour, 10,400 cu.yd. at Boulder Dam, and is one-third higher than the 15,844 cu.yd. world's record pour made on Aug. 29, 1937, by Mason-Walsh-Atkinson-Kier Co., contractor for the foundation of Coulee Dam. M-W-A-K, incidentally, is part and parcel of CBI.

The new world's record is all the more remarkable because it exceeds the most optimistic predictions of the contracting company or its superintendents —and because it far surpasses the rated theoretical capacity of the mixing plant.

When it became apparent that the crews were on the way to establishing a new record, a number of betting pools were organized by engineers and construction men. Top figure in these pools was 19,000 cu.yd., a guess made by a CBI superintendent. Theoretical capacity of the mixing plant (operating on a 2-min. mix) had been placed at 18,432 cu.yd. By clipping seconds, and half-seconds, at every corner this theoretical capacity actually was exceeded by 2,252 cu.yd.—or about one-ninth!

To Excavate 80-Acre Iowa Gypsum Deposit

Mineral rights to 80 acres of gypsum deposits near Fort Dodge, Ia., have been acquired by Louis W. Smith. According to Mr. Smith, the vein is about 25 ft. in thickness and lies approximately 50 ft. below the surface.

Production of the material is expected to start in July with output averaging about 250 tons per day. For the present the rock will be crushed and sold untreated. A processing plant may be erected later on.

Building-Supply Firm Buys Gravel Company

The William Miller Co., building-supplies firm of Columbus, O., has acquired the physical assets of the Ohio Sand & Gravel Co., with a plant and deposits located on Hart Road, near Columbus.

The Miller company has been operating a sand-and-gravel plant at Columbus for some time and the acquisition of the above operation will considerably increase its output.

EDITORIAL

A New Attack on Highway Transportation

CLOTHED in the dress of a fact-finding and impartial report, there recently appeared from the offices of the Association of American Railroads a fresh attack on the highway system of this country. Under the innocent-looking title, *Highway Costs; a Study of Highway Costs and Motor Vehicle Payments in the United States,* it presents all the time-worn complaints of the railroads against our most modern and most flexible form of transportation which they have voiced during the last twenty years. To give it the appearance of having sprung from a wholly disinterested approach to the subject of highway costs two of its three joint authors, C. B. Breed and W. S. Downs, seem to have been chosen for the breadth of their titles, the one being professor of railway and highway transportation at the Massachusetts Institute of Technology, the other being professor of railroad and highway engineering at the West Virginia University. The presence of the words "and highway" in each title, even though in second place, implies that each man's field of activity and intellectual bias is equally divided between the two kinds of transportation, yet the prejudicial nature of the presentation quickly disillusions the reader who makes even a superficial analysis.

For many years the business of the railroads has been subjected in ever-increasing degree to the competition of other forms of tranportation. In this respect it does not differ from many other businesses, but the similarity is weakened by the fact that railroad ownership has been concentrated in comparatively few corporate hands, whereas the ownership of most other businesses has been scattered among many. This fact has given the railroads a more alert consciousness of their interests and of the need for protecting them at whatever cost; it has made them more powerful through the influence they have exerted and continue to exert with legislators, state and national; it gives them advantages through their unanimity of thought and action that are not possessed by other types of business. For decades they have been looked upon as the "backbone of our economic life," the link which has bound together the widely dispersed people of the country, the agency which has carried the necessities and comforts of a rapidly-growing civilization to the back woods and the distant corners of the land. No other business has been so widely—and justly—lauded for its contributions to the spread of our people; no other business has been so ready to accept complacently the position of the lifeline of the nation; no other industry has been quite so insistent, quite so active, in protecting, consolidating and attempting to perpetuate its position. This newest example of railroad propaganda is, therefore, "in character."

The competition which has beset the railroads in the last three decades has not been, in the opinion of the railroads, fair. It has made use of facilities which have not been provided solely by those who use them. It has been able to provide advantages in the form of speed and convenience which no means of fixed transportation possesses. It has been characterized by individual ownership and individual control and by a degree of flexibility and fluidity that are far and permanently beyond the range of railroad transportation. Therefore, say the railroads in effect, flexible highway transportation must be shorn of these advantages, or they must be made so costly that no one will avail himself of them, in order that the long-established, somewhat outmoded but still necessary, fixed lines of transportation may continue to flourish. By this means, the railroads believe, the traffic which has been diverted from them can be returned to them and they can recapture their former position of transportation leadership. It is the object of their newest example of anti-highway transportation propaganda to prove the case of the railroads against that of the highways and to make the use of the latter so costly to those who ride or ship goods over them that the highways will serve no wider purpose than the feeding of pay-freight and pay-passengers to railroad stations. To accomplish this purpose *Highway Costs* has been published to demonstrate, as the introduction says, "beyond any doubt that highway transport has been and is being substantially subsidized by government."

THERE is not sufficient space here for a detailed examination of the arguments and voluminous data presented to support that thesis, but one or two points may be mentioned to show the quality and sincerity of the discussion. At the outset much space is devoted to an attempt to designate highway transport as a "public utility" in the same sense as that in which railroads, electric light and power companies, telephone companies, and the like are commonly thought of. This claim of identity is asserted boldly and is pressed to and even beyond the limits of reasonable argument. No point or analogy that could serve the authors' ends is neglected, although no mention is made of the profit motive, the greatest and most important difference between the railroads, which are corporately-owned and are operated solely in the interest of profit, and the facilities of highway transportation, which are publicly-owned in so far as the

roadways are concerned and individually-owned in so far as the vehicles are concerned, and which are made available and are operated not for profit, but for public convenience. Highway transport in the socio-economic sense is no more to be compared with railroad transport than are city streets, public sidewalks, bathing beaches, public parks, and the like. The profit motive plays no part in any of these, nor is there any attempt to pay for their construction and maintenance by pro-rata taxation of those who use them, which is the basis on which, according to the railroads, highway-transport facilities should be built and maintained.

THIS claim does not seem to be based on grounds of equity or law—although a single legal decision is quoted in support of the authors' contention that highways should be financed and operated in exactly the same manner as are public utilities operated for private profit—but rather on the ground of self-interest. It is hoped, as futilely now as it was twenty years ago, that oppressive taxation, carried as near as possible to the point of confiscation, will succeed in eradicating a form of public service which has commended itself to the public not on the basis of its economic justification but on the basis of its great convenience.

Cost is not always the criterion by which commodities and facilities are judged; it is not even often the test. Ease of use, readiness for use, physical comfort, independence of restrictive facilities, are factors that stand preëminent in the mind of the average person. Even the railroads, which insist that highway transport be judged on the basis of its cost and relative economy when compared with other means of transportation, did not thrive on demonstrated economy to shippers or consumers. They provided a convenient mode of travel that was far more expensive than the means they ultimately nearly supplanted, but it was easier and pleasanter to ride in the early railroad cars, meager as were their conveniences compared with those of our day, than in a buggy, wagon, or stage coach. Washing machines, dish-washers, automobiles cost more than the methods they superseded, but their advantages in convenience outweighed the disadvantage of greater cost. People in our large cities gladly pay higher fares for transportation in motor buses than those charged for street-cars because of what they consider the greater riding comfort, the greater convenience, the greater freedom from traffic interruptions. These things are worth a price, and those who provide more convenient facilities have demonstrated it beyond the possibility of refutation.

The competition offered to the railroads by highway transport is not the only basis of their complaint. They object to paying general taxes for the construction and maintenance of facilities that, as a consequence on their use, eat into railroad earnings and profits. They feel that the users of the highways should bear the entire cost of their building and maintenance on the theory that they alone enjoy the benefits. Arguments based on this contention are hardly honest. The railroads themselves are among the greatest beneficiaries of our system of public roads. Without city streets it would be almost impossible to bring freight to or from city railroad stations. Without rural highways it would be practically impossible to bring the products of farms and other rural industries to railroad shipping points. Few cars would ever be loaded with freight if the public, through government taxation, had not provided the roadways that bring traffic to the railways and the railways to the traffic. The railroads are only one link in the chain of distribution through transportation. The service they render is naturally and unavoidably incomplete. In past years they have attempted to bridge the gaps at the two ends of their service by the use of motor vehicles and publicly-owned and publicly-paid-for streets and highways in store-door delivery.

When the railroads were built they were given large tracts of land from the public domain for their rights-of-way and cities have favored them in the location of their stations and yards. They have never been reluctant to accept facilities and advantages offered by the public, and the service they have rendered was in many cases made possible and in all cases made more efficient and profitable by reason of public coöperation. It is not fitting that they should complain if other forms of public service, such as the highways, should receive assistance from government agencies. Modern society is a coöperative enterprise in which the services that further its convenience and happiness are provided largely by public aid initiated and directed by government. The benefits of these services reach much farther than anyone can discern and no method has yet been devised that will apportion the burdens of providing them in direct ratio to the degree to which each member of society benefits from them.

YEARS ago the railroads might have embraced highway transport as a natural enlargement of their accepted functions, but their managements were too stupid to see the opportunity. To-day, despite their backwardness and lethargy, they control a large part of the transport of passengers for profit over our highways, which have been built and maintained partly by general taxation levied on those who do not share in those profits. The public considers the convenience worth the cost. The difference in attitude between the public and the railroads arises from a difference in motives. The public thinks in terms of service and use values; the railroads think in terms of profit on invested capital. This difference is the essence of the problem, and the railroads' unwillingness to recognize it and their determination to present their pleas in the form of fallacious argumentation merely hastens the arrival of the day when railroad transportation will be made a truly public service under public management.

Summary of Primary-Crushing Tests

The United States Bureau of Mines has issued a Report of Investigations under the title, *Primary Crushing: Summary of Field Tests* by Mark Sheppard. The investigational work done by Mr. Sheppard included a study of the product resulting from crushing tests with different types of primary crushers and several types of rocks. Types of crushers studied included the gyratory, Blake-jaw, single-roll and swing-hammer. Granites and limestones were used in the tests. The conclusions reached are as follows:

1. The size distribution of the products from crushing, under similar conditions of feed and discharge setting, in the Blake-type crusher, the gyratory crusher, and the single-roll crusher is similar. The size that occurs in the highest percentage is that of the discharge opening. The sizes below occur in diminishing quantities. A log-log curve of the size distribution ordinarily shows a single straight-line relationship with run-of-quarry feed and two straight-line relationships with lump feed. The first line extends from the size of the crusher opening through from one to four sizes below and has a steep slope. The second line extends from this point through the succeeding sizes at a smaller slope. This steep slope of the distribution curve at sizes near the crusher opening indicates that these crushers tend to produce a large percentage of the product at sizes near the discharge opening or, in effect, to control sizing of the material by the crusher.

2. Changes in the size distribution of the feed to the crusher are reflected to some extent in the size distribution of the product.

3. Crushing a selected size of small lump stone produces a higher percentage of coarse product in the sizes near that of the crusher discharge than does the crushing of large lump stone.

4. Crushing run-of-quarry stone produces more fines than does the crushing of lump stone.

5. The size distribution of the product from crushing in the swing-hammer mill differed greatly from that of the other crushers used in the experiments. The size that occurred in the highest percentage was smaller than the size of the discharge opening, and a log-log curve of the size distribution of the product shows a single straight line from the maximum percentage through the succeeding smaller sizes. This indicates that the crusher does not tend to produce a larger percentage of a certain group of sizes.

6. Changes in the size distribution of the feed to the swing-hammer crusher did not cause any change in the size distribution of the product. The product from crushing run-of-quarry stone did not contain more fines than did the product from crushing lump stone.

7. Changing the size of the discharge opening of Blake-type crushers caused changes in the size of the product. A change of 2¼ in. in the crusher discharge caused a change of about 4¼ in. in the size of the product.

8. The effect of scalping the material smaller than the crusher-discharge opening from the crusher feed and recombining the scalped material with the crushed product was to reduce the amount of fines produced, irrespective of the friability of the stone crushed. In crushing friable material, however, the difference in amount of fines produced in crushing scalped and unscalped run-of-quarry feed was large, whereas in crushing hard and tough material the difference was small.

9. At the same crusher setting, the product from crushing friable stone contained more fines than did the product from crushing stone that was harder and tougher.

10. The shape distribution of the products from jaw and gyratory crushers was similar. A typical shape distribution of the products shows that the crusher oversize is composed principally of pieces of intermediate shape. At the size of the crusher opening about 80 per cent. of the product consists of cubical material and only 1 or 2 per cent. of slabs. At succeeding smaller sizes the percentage of cubical material decreases and the percentage of slabs increases. The —1.05-in. size is composed of about 60 per cent. cubes and about 8 to 10 per cent. slabs. The shape distribution in the sizes below the —1.05-in. size remains about constant.

11. The shape distribution of the product from the swing-hammer crusher is the same in all sizes. The product contained between 80 and 90 per cent. cubes and about 1 per cent. slabs at each size.

12. Slabs are formed principally by radial cracks caused by compression and are preponderant in the smaller sizes. The larger sizes are predominately cubical pieces, resulting from impact cracks through the material normal to the crushing faces.

13. Crushing is caused largely by compression in the jaw crusher, the gyratory crusher, and the single-roll crushers. While large pieces in the single-roll crusher are broken by the impact of the slugger teeth, the crushing is finished by compression as soon as the pieces are reduced sufficiently to be nipped between the roll and the concave. Crushing is caused entirely by impact in the swing-hammer crusher.

14. Comparison between the Blake-type and gyratory crushers indicates that the size distribution and the shape distribution of their products is similar under similar conditions of feed and operation.

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12 Sizes Eliminated in Standard for Aggregates

The current revision of Simplified Practice Recommendation R163-36, Coarse Aggregates (crushed stone, gravel and slag), has been accorded promulgation, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. The revised recommendation will be identified as *Simplified Practice Recommendation R163-39.*

This recommendation was first promulgated in 1936. At that time, two groups of sizes with the same overall range, but with different intermediate size ranges, were recommended. Each group was intended to be substantially complete and only one was intended to be used in any single marketing area. The Joint Committee of the Mineral Aggregates Associations in submitting this plan recognized the disadvantage of having two groups, but pointed out that when wide acceptance of the recommended sizes had been obtained effort could be made to consolidate the two groups.

As a result of experience gained since 1936 the Standing Committee was able to achieve the desired consolidation of sizes into one group, and thus effect a net elimination of 12 sizes. The revision, like the original, comprises primary sizes and their combinations or modifications, but closer tolerances have been fixed for the lower limits of each size; a 5-per cent. limit having been placed on a size smaller than the nominal minimum to further control the amount of fine material. One size was added to meet a growing demand for fine seal construction for surface treatment of airports and for other surfaces requiring a fine seal material.

Until printed copies are available, mimeographed copies of this Simplified Practice Recommendation may be obtained without charge from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

Following a thorough overhauling, the Stroh, Ind., plant of the Wabash Portland Cement Co. has again gone into production.

Glenn J. Hall is superintendent.

Left to right.—Front row: L. M. Hansen (Industrial Silica Corp.), Wilbert Bivins (National Pulverizing Co.), E. M. Ayers (Ayers Mineral Co.), Ralph T. Stevens (Cape May Sand Co.), Russell G. Hay, president, (Ayers Mineral Co.), A. Warsaw (Wedron Silica Co.), V. P. Ahearn, executive secretary, and Stanton Walker, consulting engineer (National Industrial Sand Assn.), John F. Putnam (National Silica Co.). Middle Row: M. R. Taggart (Taggart & Co.), George A. Thornton (Ottawa Silica Co.), Alfred I. Miller (Whitehead Bros. Co.), E. J. Beyer (Michigan Silica Co.), I. M. Strouss (Decker's Creek Sand Co.), Stanley A. Phillips (Pit and Quarry), Henry C. Thornton (Ottawa Silica Co.), Floyd M. Wheat (National Pulverizing Co.). Back Row: Bror Nordberg (Rock Products), Christian Mathiesen and A. Y. Gregory (Whitehead Bros. Co.), E. H. Daugherty, Ernest C. Brimfield and Alfred V. Brimfield (Taggart & Co.), T. C. Waters, T. C. Matthews (Pennsylvania Glass Sand Corp.), Charles Runkle (Ayers Mineral Co.).

Producers of Industrial Sand Discuss New Laws, Research, Labor Relations

THE fourth annual convention of the National Industrial Sand Assn., held at Atlantic City, N. J., May 24 to 26, attracted 28 representatives of 16 producing companies to its meetings. The program provided papers and discussions on occupational-disease legislation, research, federal legislation and its effects on the industry, and the problem of labor relations.

Russell G. Hay, the association's president, opened the meetings with a brief speech of welcome and a summary of the past year's activities.

Theodore C. Waters, counsel of the association, brought his listeners up to date on their knowledge of laws applicable to dust hazards and employer responsibility in his discussion of the *Trend of State Legislation in the Occupational Disease Field*. He said in part:

"Three important bills relating to silicosis were introduced at the 1939 session of the New York legislature, which had as their purpose the increase of compensation for silicosis injuries. Under the law now effective there is a limitation of the employer's liability for silicosis injury in the total amount of $3,000, and the bills referred to would have removed this limitation and increased the benefits under the law. The bill, sponsored by the Labor Department, would have provided compensation for silicosis injuries to the same extent and in the same amounts that traumatic or accidental injuries are presently compensable. As an attempted compromise certain industries sponsored a bill that would have increased the maximum benefits from $3,000 to $7,000. The result of the legislative hearing held upon these bills was that all the bills were killed and the $3,000 limitation of liability was retained.

"There has been introduced another bill that would increase the medical benefits for dust diseases. Under the present law an employer is required to furnish 90 days' medical treatment to an employee injured by dust disease, which period may be extended by the board for an additional 90 days. The proposed amendment gives to the Workmen's Compensation Board the right to increase the period for medical treatment to not to exceed 180 days. I am informed that this bill as drawn will be passed at the present session as an agreed bill, but its effect will not be to increase materially the cost of silicosis compensation in the state.

"The Pennsylvania occupational-disease bill adopted at the 1937 session of the legislature contained a limitation of the employer's liability for silicosis injuries in the amount of $3,600. The state Department of Labor and Industry advocated a plan for contribution from the commonwealth for silicosis injuries and the law made provision whereby during the first year after the effective date of the act, if disability occurred, the employer paid 1/10 and the commonwealth 9/10 of the compensation payable, with an increasing liability of the employer of 1/10 per year over a period of ten years. That feature of the law, together with certain other provisions, was the subject of an attack made upon the bill by the coal interest which arose in the case of

Rich Hill Coal Company, et al. v. Bashore, resulting in a decision of the Supreme Court of Pennsylvania, holding that certain features of the Pennsylvania law were unconstitutional. Due to this pending litigation, the administration of the law for the past two years has been chaotic. Additional litigation is now pending and the Workmen's Compensation Board and the Attorney General's office have been in a quandary as to the law's interpretation. As a consequence, there is now pending in the Pennsylvania legislature a bill to amend the law. This bill, as introduced, retains all the provisions important to or protective of industry that were in the law as passed in 1937, including the following:

"1. Denial of compensation for partial disability.

"2. Limitation of an employer's liability to the amount of $3,600.

"3. Provisions relating to the Medical Board have been extended to make the Medical Board's findings of fact upon medical questions final.

"The amending bill has passed the House and is now pending before the Compensation Committee of the Senate.

"In New Jersey the same bill that has been repeatedly offered at the legislative sessions for the past ten years, seeking to add 'pneumoconiosis' as one of the scheduled compensable occupational diseases under the New Jersey law, again appeared at the present session. In its present form there seems to be but little likelihood of the enactment of this bill."

The State of New York has been very active in its program of prevention of occupational diseases and has promulgated rules and regulations for the control of industrial processes where occupational-disease hazards exist. The two important codes that have been the subject of study in New York State are:

(a) The Stone Cutting and Finishing Code.

(b) The Foundry Code.

The Stone Cutting and Finishing Code has been approved by the Code Committee and submitted in final form to the Board of Standards and Appeals. Of particular interest are the provisions defining injurious dust concentrations, which are divided into three classifications:

1. Stone containing less than 10 per cent. of free silica, where the permissible concentration of dust is 100,000,000 particles of dust per cu.ft. of air.

2. Stone containing from 10 per cent. to 70 per cent. free silica, where the permissible concentration of dust is 10,000,000 particles of dust per cu.ft. of air.

3. Stone containing 70 per cent. or more free silica, where the permissible concentration of dust is 5,000,000 particles of dust per cu.ft. of air.

"At the time this code was approved by the Code committee the final determination of the definition of 'injurious dust concentrations' had not been written into the proposed Foundry Code," said Mr. Waters, "and Mr. Ahearn and I decided to await the completion of the Foundry Code before raising objection to the provisions of the Stone Cutting Code. The Foundry Code has now been adopted and fixes injurious dust concentrations at 25,000,000 particles per cu.ft. of air, irrespective of the free-silica content of the dust:

'X-8. Dust, fume and gas control.

'X-8.1. General requirements.

'All foundry operations shall be executed and the general conditions of the plant structure, equipment and working area shall be maintained so as to prevent the dissemination of dust, fume and gas in the breathing zone of the foundry workers in excess of the following average concentrations:

'X-8.1.1. Dust:

'Twenty-five million particles per cu.ft. of air for any foundry operation except abrasive blast cleaning in which process the concentration shall not exceed ten million particles per cu.ft. of air.' "

It is particularly interesting to note the differences in the various codes as to what constitutes an injurious dust concentration, said the speaker. For example, the Stone Cutting Code, with its classifications of dust dependent upon free-silica content, establishes a permissible concentration of dust from 5,000,000 to 100,000,000 particles per cu.ft. of air; the Foundry Code establishes a permissible concentration of dust of 25,000,000 particles per cu.ft. of air; the Rock Drilling Code establishes a permissible dust concentration of from 10,000,000 to 100,000,000 particles per cu.ft. of air, dependent upon the free-silica content of the dust.

Mr. Waters then referred to numerous cases which have been decided by the courts. Most of these have been reviewed from month to month in PIT AND QUARRY.

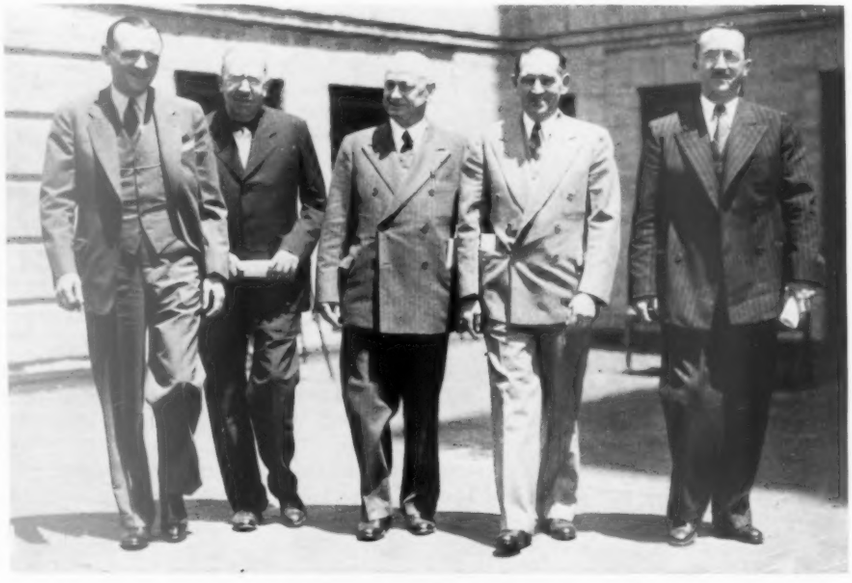
Mr. Waters mentioned Senate Bill No. 2256, introduced by Senator Murray in the Federal Congress on April 27, 1939. "The basic purpose sought to be accomplished by the bill is revealed in its first section," he said, "and I quote this section in part:

" 'That (a) for the purpose of enabling each state (1) to provide more adequate protection to workers and their families from economic losses caused by disability or death resulting from dust diseases, and (2) to promote the prevention and control of industrial health hazards causing dust diseases, there is hereby authorized to be appropriated for each fiscal year, beginning with the fiscal year ending June 30, 1940, a sum sufficient for making the payments hereinafter provided for to states which have submitted and had approved by the Secretary of Labor, state compensation plans and prevention plans.'

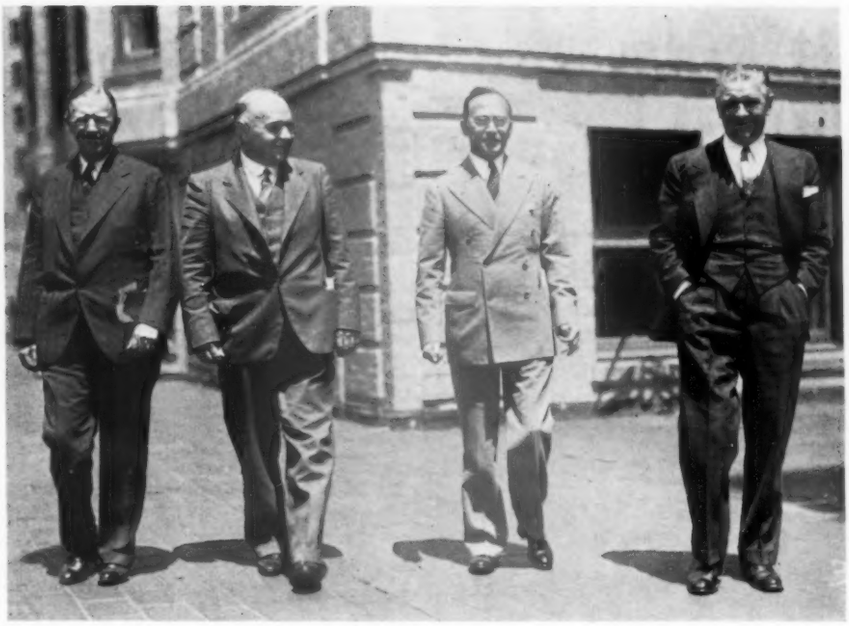
"By definition the term 'dust diseases' includes silicosis and any other diseases caused by the inhalation of dust particles.

"The bill provides that a state compensation plan shall not be approved by the Secretary of Labor except upon the following conditions:

"1. That the plan provide for compulsory workmen's compensation cov-



V. P. Ahearn (National Industrial Sand Assn.), John F. Putnam (National Silica Co.), J. M. Strouss (Decker's Creek Sand Co.), A. Y. Gregory (Whitehead Bros. Co.), E. H. Daugherty (Taggart & Co.).



Russell G. Hay (Ayers Mineral Co.), Ralph T. Stevens (Cape May Sand Co.), A. Warsaw (Wedron Silica Co.), L. M. Hansen (Industrial Silica Corp.).

erage by insurance methods deemed by the Secretary of Labor to be satisfactory.

"2. That it provide for the payment of compensation for silicosis injuries equal to compensation for accidental injuries.

"3. That it prohibit waiver of disability benefits by workers.

"4. That it provide procedural safeguards to insure prompt payment of benefits.

"5. That it provide for compulsory reporting by employers of all dust diseases.

"6. That it prohibit discrimination with respect to hire or tenure of employment by employers against any person on the ground of his previous exposure to dust disease hazards.

"7. That it provide for state expenditures adequate to insure the efficient administration of the state law.

"The bill further grants to the Secretary of Labor of the United States broad discretionary powers with respect to the approval of plans for prevention, the details of which are too voluminous for specific reference at this time.

"In conclusion," said Mr. Waters, "I express the hope that this brief discussion has renewed your interest in and concern about the problems of occupational-disease legislation and an employer's common-law liability for compensation for occupational-disease injuries. During the past year the emphasis upon this subject has increased and it presents to you a problem that will be with you throughout the years to come. With full realization of the potential liability that is yours, I hope that each and every member of this association will develop and perfect the ways and means to prevent silicosis injuries to his employees. Don't sit back with a false sense of security and protection because of the compensation laws that exist in your states. Follow the administration of these laws carefully and continue your interest in the coming legislative sessions where vital amendments and changes in these laws may be made."

Stanton Walker, consulting engineer of the association, discussed the organization's technical activities. Referring to the work of the Research Committee, he mentioned the Foundry Sand Committee which it had appointed. Its membership includes J. A. Crew (Ayers Mineral Co.), H. E. Donnocker (Ottawa Silica Co.), C. Mathiesen (Whitehead Bros. Co.), F. L. Weaver (Great Lakes Foundry Sand Co.), P. G. Forman (Industrial Silica Corp.), and Mr. Walker. The committee held its organization meeting in August, 1938,

M. R. Taggart (Taggart & Co.), Stanton Walker (National Industrial Sand Assn.), George A. Thornton (Ottawa Silica Co.), E. J. Beyer (Michigan Silica Co.).

when it was agreed that the first principal activity should be a consideration of the significance of the American Foundrymen's Assn. recommendations for sand requirements with particular attention directed to those affecting the production of sand. The A.F.A. book on *Foundry Sands and Clays,* which had only recently been published, was discussed in considerable detail and particular attention was paid to the proposed purchase form. Various committee assignments were made looking toward a critical review of the purchase form, the development of a method for sampling unbonded sands, and a consideration of measures of grading.

At the committee's second meeting in November, 1938, there was presented a proposed method for sampling unbonded sands. In the discussion of that method and of the proposed purchase form the wide variations in sieve analyses obtained with different sieves was pointed out and attention was called to the significance of such variations in relation to the tolerances suggested in the A.F.A. purchase form. It was suggested that coöperative tests be undertaken to demonstrate the variations which might be expected to result from grading analyses conducted on identical samples in different laboratories as well as those which might result from different methods of sampling.

"The purchase form," Mr. Walker explained, "is merely a tentatively recommended form for outlining desirable characteristics of foundry sands and it suggests no specific limits as to those characteristics. However, it does give suggested tolerances. For example, a plus or minus range of 20 per cent. on the amount retained on any sieve is recommended. That sounds like a rather wide range, but when it is considered in connection with the wide variations which exist even among standard sieves, the wide variations in testing technic, the wide variations in the condition of sieves, and, particularly, in relation to those sieves retaining only small percentages, its impracticability will be realized.

"Pursuant to the plans of our Foundry Sand Committee, formulated at its November meeting, a group of tests were conducted in which the laboratories of all producer members of the committee coöperated. Twelve samples of sand were prepared, nine by one company, two by another and one by a third. Those samples, consisting of 100 grams each, were tested first by the member of the committee preparing them and then passed on to other members of the committee. That is, it was the identical sample recovered from the testing sieves which was sent on the rounds. The results obtained by each of the coöperating laboratories were

sent to me and I had them summarized for the consideration of the committee. The study on the method of sampling was carried out by two members of the committee. It involved tests of samples selected from the same source by six different methods. . . .

"The range in values obtained exceeded the suggested 20-per cent. tolerance many times. That was particularly true for those sieves retaining relatively small fractions, where the range frequently exceed 200 per cent., but it was also true of many sieves retaining substantial fractions."

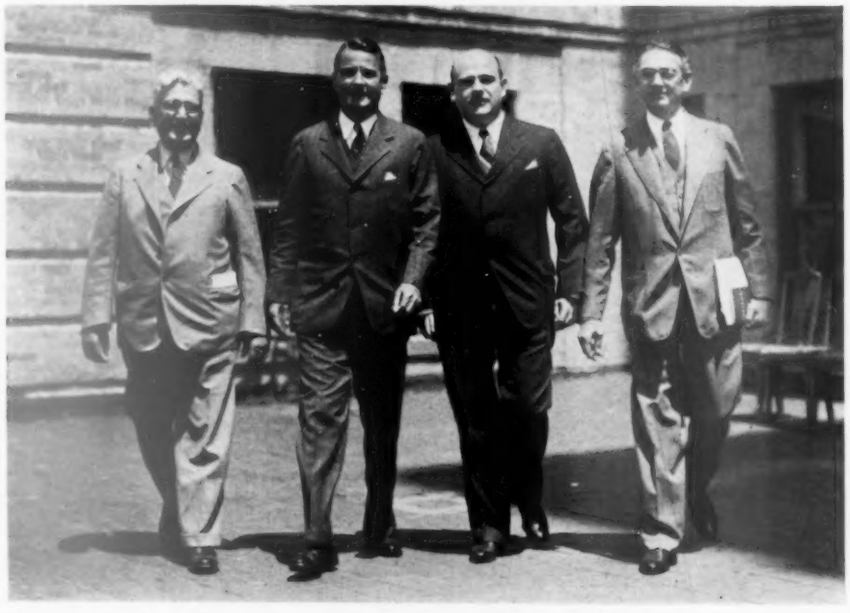
The Sand Research Committee of the American Foundrymen's Assn., at a meeting during the afternoon of the same day, voted to delete all suggested tolerances and to include a paragraph recommending that suitable tolerances be arrived at in each case by consultation between the producer and the consumer. That vote carried with it the recommendation to the A.F.A. that all existing copies of the book, *Foundry Sands and Clays,* now in the hands of the A.F.A. be corrected by a suitable sticker.

The Foundry Sand Committee of the National Industrial Sand Assn. has outlined still further tests which it is planned to make. Certain members of the committee have accepted the assignment of preparing approximately 90 samples of sand—about 30 of each of 3 different grades. It is intended to send one sample of each of the 3 grades to some 20 to 30 laboratories, including commercial testing laboratories, consumers' laboratories and producers' laboratories. These samples are of "sharp" sands. At least two other members of the committee are to furnish samples of bonded sands to a selected

Wilbert Bivins and Floyd M. Wheat (National Pulverizing Co.), E. M. Ayers (Ayers Mineral Co.).

group of customer laboratories for the determination of not only grading, but also characteristics such as permeability, strength, clay contents, etc. From such data it is expected to demonstrate conclusively the futility of any generally applicable tolerances sufficiently rigid to be useful in specific cases. The committee also proposes that it will prepare certain standards covering test methods, etc., and that such standards, after receiving adequate industry consideration, will be used as the bases of recommendations to the Sand Research Committee of the A.F.A.

Other activities under the jurisdiction of the Research Committee which have been suggested as being desirable involve studies in relation to the dust hazard, characteristics of abrasive sands, and characteristics of miscellaneous sands. It has also been suggested that it might be desirable for the association to retain, on a consulting basis, an expert chemist and an expert in dust control. The thought was that members of the association might make use at their own expense of such retained consultants.



Wilbert Bivins (National Pulverizing Co.), T. C. Matthews (Pennsylvania Glass Sand Corp.), T. C. Waters, Alfred J. Miller (Whitehead Bros. Co.).

V. P. Ahearn, the association's executive secretary, reviewed the legislation situation in Washington. Of the probable changes to be voted by Congress with reference to taxes he mentioned:

a.—Substitution of a flat 18-per cent. tax on corporation income above $25,000 to replace the existing tax of 16½ to 19 per cent. graded according to the amount of income distributed. The 12½- to 16-per cent. tax on income under $25,000 would be little changed.

Removal of the $2,000 limit on deductions for capital losses.

Revision of the capital-stock tax to permit change in capitalization each year, instead of each three years, for taxation purposes.

Provision for permitting losses to be carried over for three years instead of one.

Pay-roll tax modifications.

b.—Extension of excise taxes.

c.—Corporations earning more than $25,000 are taxed 16½ per cent. If some of the profits are retained instead of being distributed, the tax is increased, proportionately, up to 19 per cent.

Corporations earning less than $25,000 are taxed 12½ per cent. on the first $5,000; 14 per cent. on the next $15,000; 1 per cent. on next $5,000.

The corporation income tax produced $1,300,000,000 for the 1938-39 fiscal year.

The excess-profits tax now is 6 per cent. on net income of corporations above 10 per cent. but under 15 per cent. of their declared value; and 12 per cent. on net income of corporations above 15 per cent. of their declared value.

This tax produced $36,000,000 in 1938-39.

d.—The Treasury's program is said to embody five main points:

(1) Repeal of the undistributed-profits tax,

(2) Modification of the capital-stock excess-profits tax to permit corporations to declare yearly the value of their stocks,

(3) Modification of the capital-loss provisions,

(4) A provision for the carrying over of operating losses, and

(5) Substitution of a higher flat corporate tax on corporations earning more than $25,000 annually, for the present undistributed-profits tax of 16½ to 19 per cent. The Treasury has estimated this higher corporate tax at possibly 22 per cent., while Congressional tax experts are of the opinion that 18 per cent. would provide equal compensating revenue.

(Continued on page 81)

PIT AND QUARRY Special

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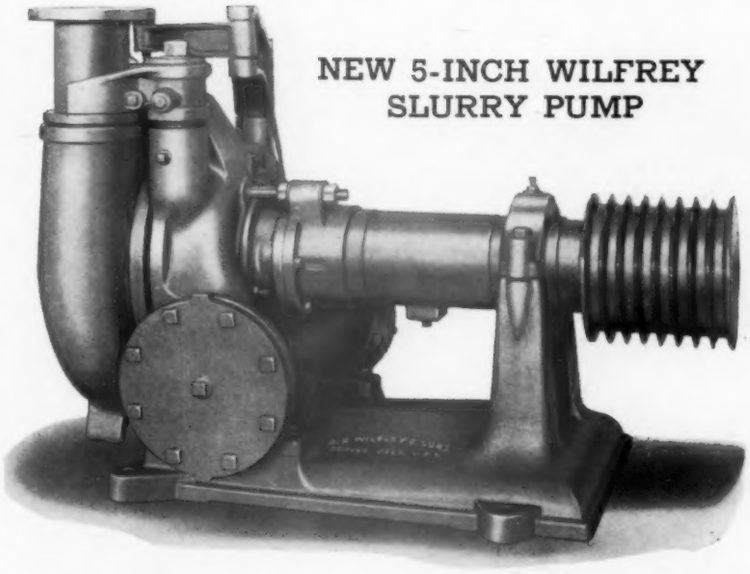

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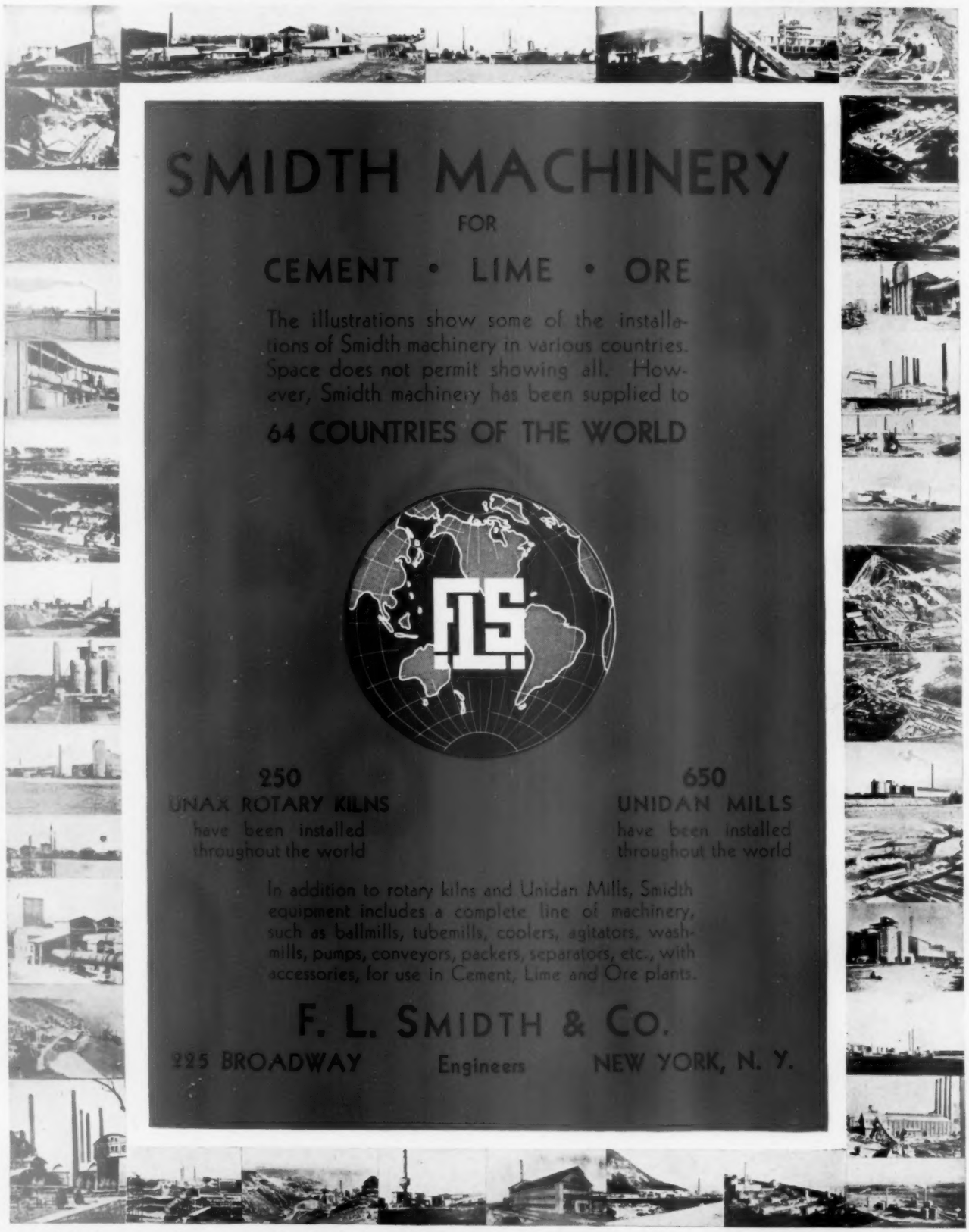

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Two New Cement-Distributing Plants on Eastern Shore of Lake Michigan

ON the waterfront at Holland, Mich., on the very docks where as a boy H. Vanderwerp, operating vice-president of the Medusa Portland Cement Co., used to play, a new storage-and-packing plant is being built by the Medusa company under Mr. Vanderwerp's direction.

Construction was started about March 1, the work being done under private contract by the James Stewart Co. of Chicago.

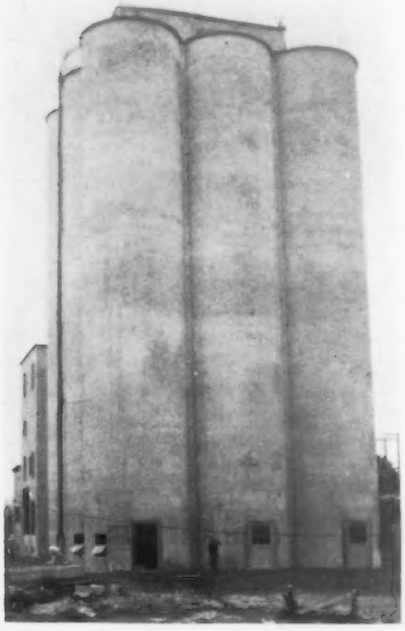
The plant, which is getting into full operation this month, consists of nine reinforced-concrete storage silos 90 ft. high and 16 ft. in diameter with a capacity of about 40,000 bbl., and a packing-and-loading building.

Clarence Anderson, formerly at the Medusa plant at Newaygo, Mich., which has not been operated for some time, has been made manager of the Holland plant and has moved his family to that city.

The Holland plant, built at a cost of about $75,000, rests on piling driven 40 ft. into the ground. Sliding forms were used in pouring the concrete. Bulk cement will be carried across Lake Michigan from the Manitowoc, Wis., plant of Medusa's subsidiary, the Manitowoc Portland Cement Co., by self-unloading vessels of the Medusa fleet and pumped into silos by the Fuller-Kinyon system. Screw-conveyors beneath the silos reclaim the cement and carry it to the bins over the packing machines. A Parsons dust-collecting system has been installed.

The plant at Holland is the third distributing plant to be operated by the Medusa company at Great Lakes ports, the others being located at Chicago and Milwaukee. The company's main offices are at Cleveland. In addition to the Newaygo and Manitowoc plants mentioned, the company operates manufacturing plants at Dixon, Ill., Bay Bridge, O., Silica, O., Crescentdale, Pa., and two plants at York, Pa.

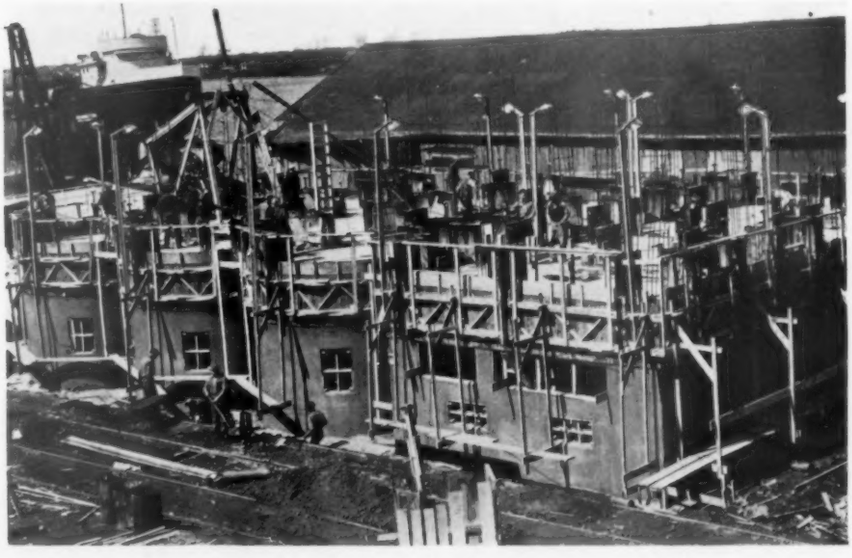
Concrete is also now being poured for another storage-and-packing plant on the eastern shore of Lake Michigan. Just 30 mi. north of Holland, at Muskegon, Mich., the Universal Atlas Cement Co. is erecting a plant designed to distribute its product in western Michigan. Storage facilities will consist of five reinforced-concrete silos 24 ft. in diameter and 70 ft. high with a capacity of about 30,000 bbl. of cement. It is to be served by the Universal Atlas plant at Buffington, Ind., located 125 mi. distant by water at the extreme southern tip of Lake Michigan.



View of the storage silos with loading pipes rising at the left.

End view of spouts and one of the screw-conveyors beneath the silos.

Another view of the distributing plant showing the pack-house and office.



The Medusa plant at Holland in an early stage of construction. Sliding forms were used.

By V. K. NEWCOMER
Superintendent, Cia. Sud Americana de Cemento Portland

A NEW DRY-PROCESS CEMENT PLANT IN

The plant at Campo Santo. Power-house and mill building at the left. Packing-house and cement silos, right.

THE dry-process plant of the Compania Sud Americana de Cemento Portland at Campo Santo in the Province of Salta of Argentina is owned wholly by the firm of Juan Minetti e Hijos. It is the latest of a chain of three plants, one of the others being a wet-process plant at Dumesnil, which is near Cordoba, where the head offices of the company are located, and another being the dry-process plant at Mendoza.

The lay-out of the Salta plant was conceived by Don Hector Minetti, vice-president in charge of the cement division of the firm, and the engineering was handled by the Allis-Chalmers Mfg. Co., which directly or indirectly furnished almost all the equipment. The plant is located directly on the State Railway, which has a gage of 1 m., not far from the towns of Salta and Güemes, in a very strategic position, since Salta is the terminus of the railroad which, when completed, will reach Autofagasta, Chile, and Güemes is the junction point for the railroad to Bolivia and Paraguay.

In reading this article it must be remembered that all the measures of stone, clay, raw mix, oil, etc., are expressed in metric tons and not barrels. The capacity of the plant is rated at 200 metric tons per day and this has easily been attained.

Using the experience of Dumesnil and Mendoza, Don Minetti has incorporated all the improvements necessary for good operation and the results achieved have proved the correctness of his judgment.

The stone, which is of an extremely porous nature, is thought to have been formed from a natural hot spring from which the gases are always bubbling. Curious formations of all types—tree sections, coral-like branches, and large voids—are constantly being found and uncovered. Due to this formation, the blasting is extremely difficult and the yield per pound of powder not all that could be wished. Sixty-two-per cent. English dynamite is used with caps and fuse in holes drilled with jackhammers. Small shots are much more successful than large ones. An Ingersoll-Rand compressor driven by a Carels Diesel engine furnishes air for the jackhammers and Ingersoll-Rand No. 45 concrete breakers which are used to break the large pieces, the cost of dynamite being prohibitive for block-holing or adobe shots.

The quarry is located about 9 km. from the plant site, the stone being conveyed to the plant by a cableway, having buckets of 750-kg. capacity, both the cableway and the buckets having been manufactured and erected by the Bleichert Co. of Leipzig, Germany. This unit is very economical as to the power consumed and the men required, the transporting buckets being the same ones that are used for hand-loading in the quarry. These buckets, when discharged from the cableway, are mounted on small trucks running on narrow-gage track for distribution through the quarry, the dismounting from the cable and to the cable being automatic. The cableway's capacity is 600 tons per hr. It is belt-driven by a 60-hp. Siemens Schukert motor.

On arrival at the plant the stone is dumped into a hopper which feeds the 16-in. Allis-Chalmers McCully crusher, whose product will pass a 1¼-in. by 1¼-in. square-mesh screen, whence it drops by gravity into storage. A 75-hp. G. E. motor drives the crusher through Texrope. A P&H electric bridge crane, having a span of 20 m. and a 2-cu. m. bucket, deposits the stone in the raw-mill feed bin. The same crane handles all the materials of production, that is, clay, gypsum, and clinker, direct to the mill-feed bins and from the cooler elevator.

The clay is dug with an Orenstein Koppel steam shovel and is transported to the plant, a distance of about 1 km., by trucks. At the plant it is elevated to a hopper and fed by an Allis-Chalmers 24-in. apron-feeder to the Allis-Chalmers 12-in. by 15-in. Pulverator and thence to storage. The feeder is driven by a 3-hp. Allis-Chalmers motor through a Falk reducer and the hammer-mill by a 40-hp. G. E. motor through Texrope. As during nine months of the year there is no rain and

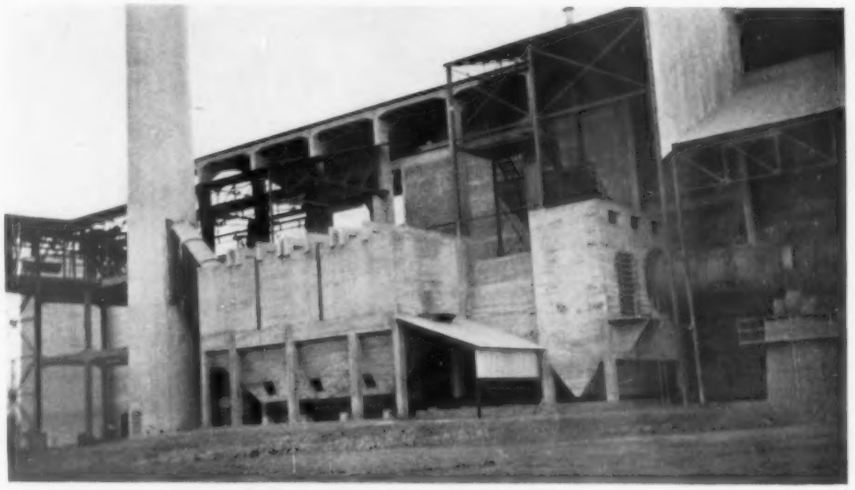
ARGENTINA

due to the fact that the drying is accomplished within the raw mill itself, no drier has been installed. The stone and clay are kept in separate bins and are fed to the No. 8726 special interior-drying Compeb mill by 20-in. Schaffer Poidometers, one for each material, driven through Winfield Smith speed-reducers by individual 3-hp. Allis-Chalmers d.-c. motors.

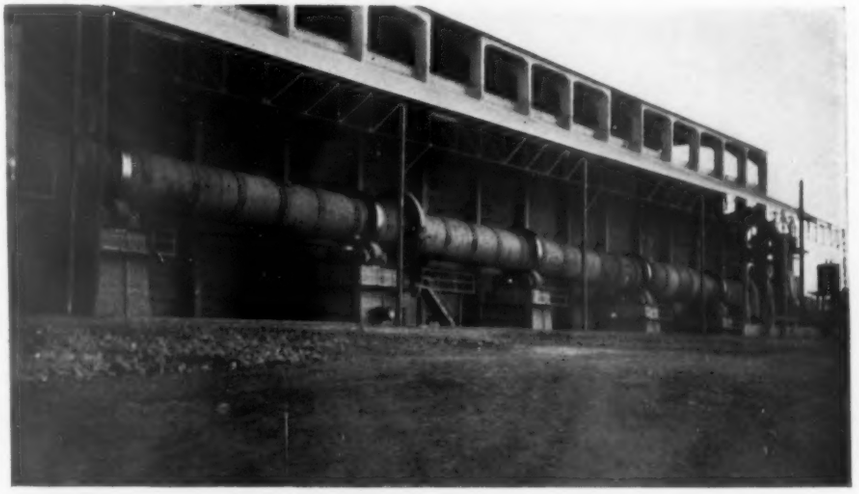
The capacity of the mill is about 18 metric tons per hr. The heat for it is furnished from a 2,000,000-B.t.u. oil-fired furnace manufactured by the Continental Industrial Engineers. The mill is equipped with a special inlet bearing, which allows the admission of air at about 600 deg. F. to the first, or preliminary, compartment, whence the greater part of the moisture and dust-laden air is drawn direct to an American Blower 22-in., type D collector, the remainder passing downward through a partition plate and then to the second compartment. This last-mentioned quantity of air is augmented by hot air introduced into the scoop housing of the mill from a by-pass pipe from the main header from the furnace. The second-compartment dust-laden air is also drawn to the American Blower collector which is driven through Texrope by a 20-hp. G. E. motor, the separated dust being sent direct to the Fuller pump, while the moisture-laden air is exhausted to the atmosphere. The fan of the dust-collector does the double function of removing the dust and drawing the hot air into the mill from the oil-fired furnace before mentioned. A 500-hp. G. E. synchronous motor drives the mill. The recovered dust is raised by a Rex Model 5CE bucket-elevator driven through Texrope by a 10-hp. G. E. motor.

A 7-in. Fuller pump, direct-driven by a 40-hp. G. E. motor, delivers the mill product to any one of four blending silos, where it is given the necessary mixing and is then passed to the kiln-feed silos, of which there are two. The four silos are controlled by a Fuller board system so that any function required can easily be accomplished without man power as to distribution. Each of the four 5-in. Fuller pumps—of which there is one under each silo—has five inlets from the silo. A 20-hp. G. E. motor drives each pump. Air for the entire system, both raw and finish, is furnished by three Allis-Chalmers rotary compressors, each having a capacity of 472 cu. ft. per min. at 40 lb. pressure.

View in the storage building. Mill bins at left.

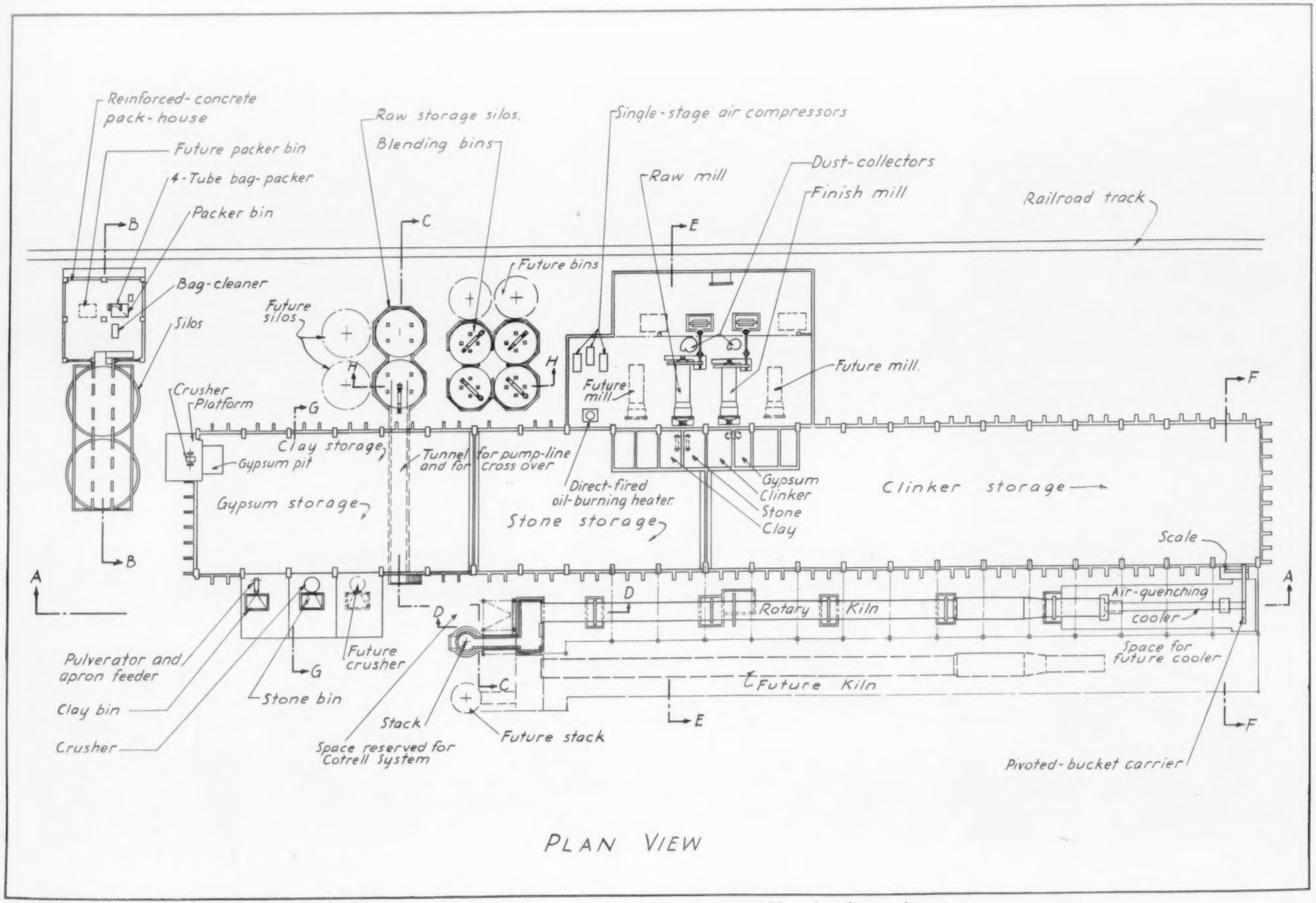


Dust chambers and louvre damper on kiln.



A view of the kiln from the feed end.

From the raw-mix storage silos the material is drawn by two No. 3 Fuller rotary feeders, each having five spouts from the silo, to a 12-in. Link-Belt screw-conveyor equipped with a screen and thence to a 7-in. Fuller pump which keeps the 50-ton kiln-feed bin full at all times. A 5-hp. G. E. motor drives each feeder through chain and a Falk reducer, while a 10-hp. G. E. motor drives the conveyor through a speed-reducer of the same make. The



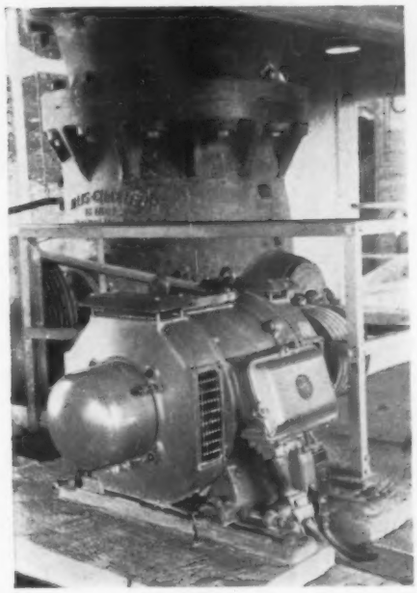
PLAN VIEW

Plan of the Campo Santo plant showing provision for a second kiln and auxiliary equipment.

Fuller pump is direct-driven by a 30-hp. G. E. motor.

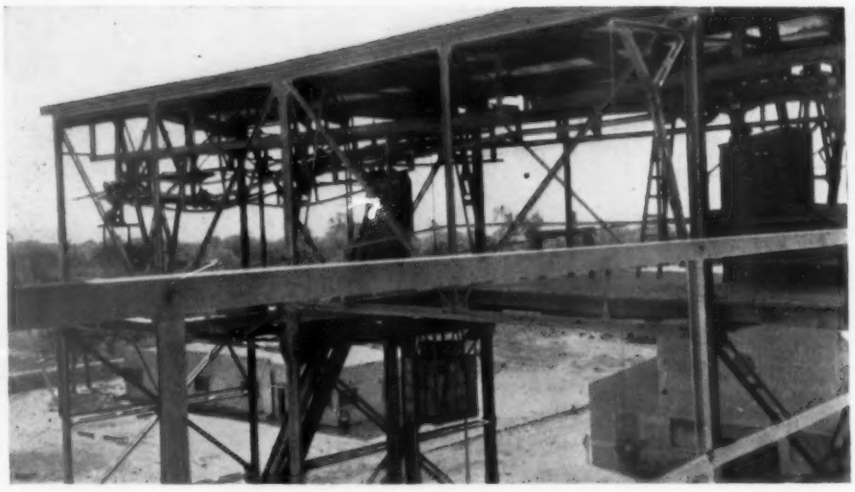
A large baffled dust-chamber has been installed with the result that very little loss is suffered through the stack and all the dust deposited in the chambers is returned to the kiln-feed bin by means of conveyors and an elevator, making the operation very clean and efficient.

The Allis-Chalmers kiln is fed by a



The 16-in. primary gyratory crusher.

No. 3 Fuller feeder and a water-jacketed screw-conveyor furnished by Allis-Chalmers, the two being driven by one 10-hp. Allis-Chalmers motor through a Falk reducer and roller chain. These two units are synchronized with the speed of the kiln so that a very good balance is maintained. The direct current used on the feeder is generated by a 5-kw. Allis-Chalmers dynamo driven through Texropes off the shaft of the kiln motor. This is a 100-hp., 2,300-v.



Cableway unloading station at the plant.

Allis-Chalmers machine driving the kiln through a Falk speed-reducer. The kiln burner, developed by Felix Hesse, the general superintendent of the company, is of the orifice-and-needle type and has proved very efficient with the extremely coarse and low-grade petroleum which can be secured locally. Primarily air is supplied by an Allis-Chalmers single-stage turbo-blower unit delivering 5,900 cu. ft. per min. at 6,400 r.p.m. and 2 lb. pressure, and driven by a 75-hp. Allis-Chalmers motor through a Falk reducer. The air for the blower is drawn from the air-quenching cooler and is, of course, preheated in addition to the heat of compression.

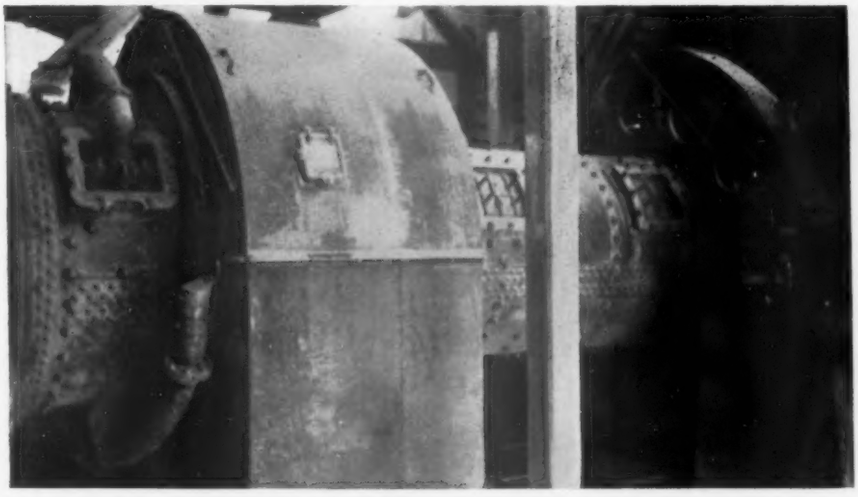
The kiln is 8½ ft. in diameter, has a 10-ft. calcining zone, is 260 ft. long and is set at a pitch of ⅜ in. to the ft. It has five tires. The trunnion bases are of the single-roll type with lifting buckets for lubrication and water-cooling coils, as is the case with the thrust rolls.

The clinker is cooled in an Allis-Chalmers 3-ft. by 50-ft. air-quenching cooler, which is driven through Texrope by a 20-hp. Reliance motor and is fitted with the usual two fans, one (an American Blower, Model 7AHS) feeding hot air to the kiln and the other (an American Blower, Model 4AHS) furnishing air solely for cooling the

Looking down on the 16-in. gyratory crusher with cableway carrier at discharge hopper above.

clinker. A single 20-hp. Allis-Chalmers motor drives the two fans through Texropes.

From the cooler the clinker drops into a Chain Belt 18-in. by 15-in. pivoted-bucket elevator which raises it to a Richardson 420-ton per hr. Convey-O-Weigh balance, whence it drops into storage to be handled by the P & H



Compartment mill for finish grinding.

50 POUNDS OF kiln dust RECOVERED PER BARREL PRODUCED

24 Buell (Van Tongeren System) Cyclones at the Kosmosdale, Kentucky, plant of Kosmos Portland Cement Company

Fifty pounds of kiln dust recovered every day for each barrel of cement produced! But that is only *part* of the story of economy and efficiency at this progressive plant.

The Kosmos Portland Cement Company is not only securing a high over-all collection efficiency. It is doing this at the lowest possible cost. It is writing off its investment in the shortest possible time.

The complete Buell Dust Collection plant will pay for itself in little more than three years. Thereafter the recovery will be practically a 100% net profit operation, for maintenance costs are so low as to be negligible.

Investigate Buell and you will find that the low initial cost and high over-all collection efficiency guarantee the maximum return on your investment.

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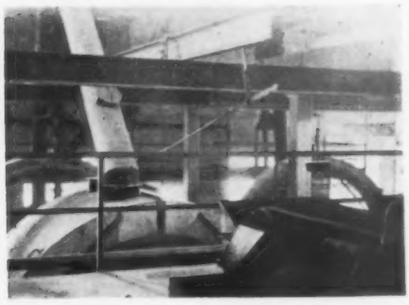
crane. A 5-hp. G. E. motor drives the elevator through a Falk reducer and two 1-hp. G. E. motors drive the Convey-O-Weigh through a Horsburgh & Scott reducer.

The first unit on the control board shows the amperage and voltage of the generator driving the kiln feeder, and this, having been calibrated, shows the tons of raw mix fed to the kiln per unit of time. Next to this is an Esterline Angus recording meter showing the number of kiln revolutions or changes in the number of revolutions,

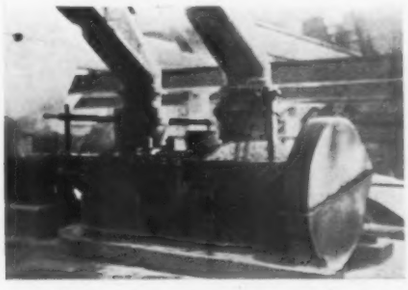


View in the raw mill. Clay feeder and automatic-weighing device in foreground.

and a counter to show the totals per shift.

Next is the Shallcross draft control which can be operated automatically to a predetermined draft or manually, but, since the type of labor is very low, it is operated practically always automatically.

Next is the Foxboro air control to the cooler, which can be set to maintain a constant weight of air passing to the cooler per unit of time by means of the differential pressure and thus obtain



Double table feeder for clinker and gypsum.

good combustion conditions in the kiln.

A Leeds & Northrup graphic meter records the temperature at the back end and in the hood, thus notifying the burner of changes in the heat some time before they are visible to the eye. This instrument was held in bad favor by the native burners for some time as they considered it a tell-tale, but since they have learned its value and aid it is known to them as "my friend."

Leeds & Northrup also furnished a Micromax to control the heat of the air entering the turbo-blower from the air-quenching cooler, but as the air is taken at the heat of the cooler this unit is not in action.

The Hays Co. furnished a gas analyzer, and a series of draft gages which show the pressures or suctions at the back end of the kiln, the hood, the entrance to the cooler, and the exhaust from the turbo-blower.

The speed of the clinker passing through the cooler is determined by the depth of the bed of clinker on the cooler grates and is raised and lowered automatically by a Shallcross control unit.

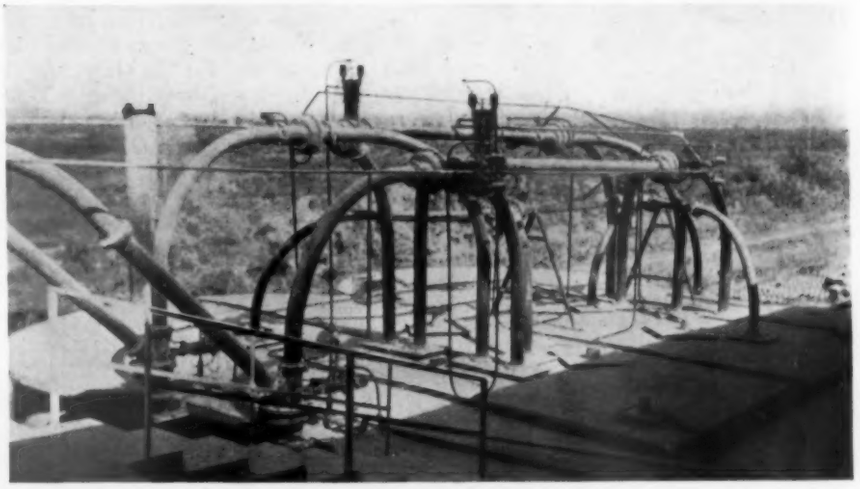
Gypsum is crushed in an Allis-Chalmers Dodge crusher with an opening 11 in. by 15 in. and is handled by the P & H crane. The gypsum is secured locally. A 15-hp. G. E. motor drives the crusher through Texrope.

The feed to the finish Compeb, a No. 8724 mill with three compartments, is controlled from two bins, one clinker and one gypsum, by an Allis-Chalmers 36-in. double table-feeder serving a common spout and the feed-screw of the mill, and driven through a Falk reducer by a 3 hp. d.-c.

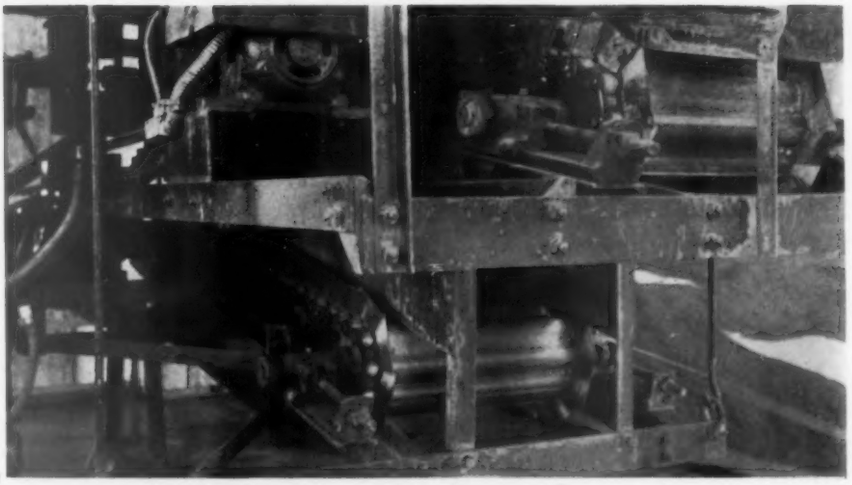
Pulverizer for clay.

Allis-Chalmers motor. This mill, like the raw mill, is driven by a 500-hp. G. E. synchronous motor, which is located in a separate room with its control equipment. Another Type D American Blower dust-collector, of smaller size (16 in.) and driven by a 10-hp. G. E. motor through Texrope, is connected to the mill, whose discharge leads direct to a 5-in. Fuller pump, direct-driven by a 40-hp. A. E. G. motor, whence the cement passes to the silos.

The pack-house is equipped with a



Bin-distributing system on the raw-mix silos.



Pan-conveyor weighing device which handles the cooled clinker.

Plant and Building Dimensions

Plant.—Length over all 552 ft. 5¾ in. (168.397 m.); width over all 184 ft. 2 in. (56.125 m.).

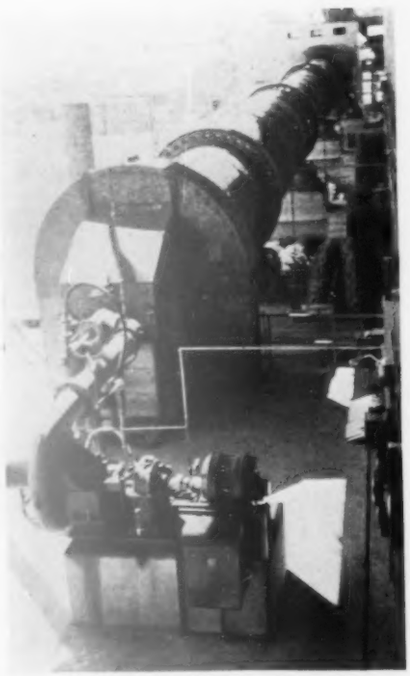
Blending Bins (4; 2 future).—19 ft. 8¼ in. (6 m.) in diameter, 42¼ ft. (12.88 m.) high.

Cement Silos (2).—32 ft. 9 11/16 in. (10 m.) in diameter, 72 ft. 2⅛ in. (22 m.) high.

Pack-house.—Reinforced concrete, 36 ft. (10.972 m.) by 38 ft. (11.582 m.).

Raw-Storage Silos (2; 2 future).—22 ft. 11½ in. (7 m.) in diameter, 45 ft. 11 3/16 in. (14 m.) high.

Stack (1; 1 future).—8 ft. (2.5 m.) in diameter, 177 ft. 2 in. (54 m.) high.

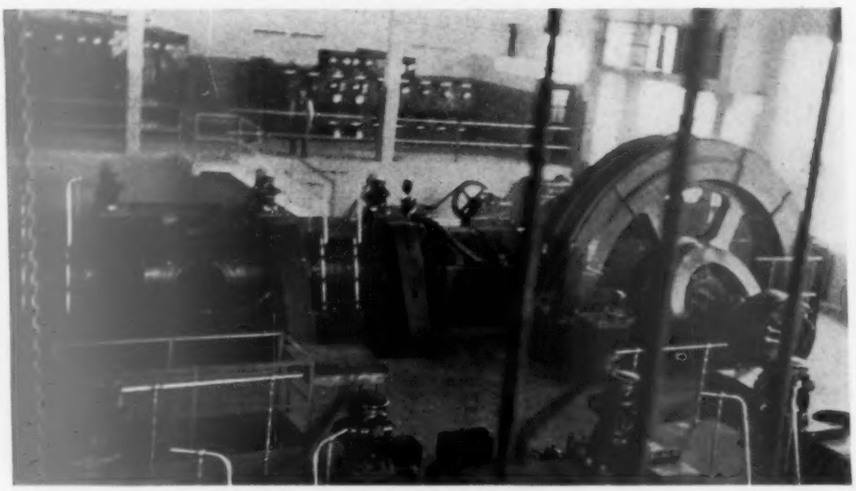


View of the kiln floor from the firing end.

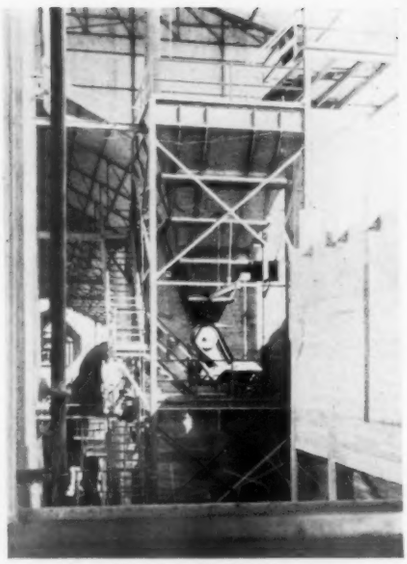
4-spout bag-packing machine of 2,000-sack per hr. capacity, a bag-cleaner, and a 32-in. Sly dust-collector. Cement is elevated to the packing bin, or circulated in the silos, by a 7-in. Fuller portable pump mounted on rails so that the one pump may draw from either silo. The bag-house is in another building and has the usual equipment of sorting tables, sewing machines, etc.

The bag-packer is driven by a 25-hp. G. E. motor and the bag-cleaner by a 2-hp. G. E. motor, both through Texropes. The 12-in. Link-Belt bag-cleaner return screw-conveyor is driven by a 6-hp. G. E. motor and the spill screw-conveyor, of the same size and make, by a 5-hp. G. E. motor, both through Falk reducers. The Model 5CE Rex bucket-elevator for returns is driven by a 5-hp. G. E. motor through Texrope. A 5-hp. G. E. motor drives the dust-collector fan through Texrope, while a ¾-hp. Master Electric motor drives the dust-collector shaker.

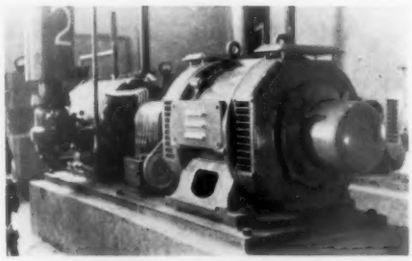
Compressed air is furnished by two 472-c.f.m. Allis-Chalmers rotary compressors direct-driven by 75-hp. G. E. motors. Two 2-in. Thyssen pumps furnish fuel oil to storage, and two 2½-in. by 4-in. Gould Tridex pumps force it to the kiln burner.



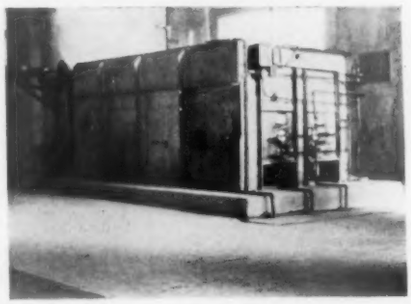
Generating and control equipment in the power-house.



View showing the kiln-feed bin and kiln feeder.



Rotary compressor and electric-motor drive.



Furnace which supplies hot air to the raw mill.

Power is furnished by two double-acting Skoda horizontal Diesel engines, each of which has a capacity of 950 kw. and turns at 125 r.p.m. To one accustomed to American single-acting, fast-running Diesels these present a curious sight with their immense flywheels with the generator coils built in them. The oil consumption per kw.-hr. is very good, and little trouble is being experienced with any part of the units.

The laboratory is completely fitted with modern equipment; all the tables are incased in tile, the scale foundations are carried to solid ground, all the physical work is carried on in the base-

Compression- and tension-testing equipment in the laboratory.

ment to deaden the noise, and each operation is performed in a separate room to prevent confusion.

The erection work was done under the supervision of O. A. Hartley of the Allis-Chalmers erecting department, assisted by Earl Grier and student engineers Carl Morris, Joseph Wolfe and B. L. Cody.

Due to the exorbitant cost of steel in Argentina practically all the plant is of concrete, which was made under contract by Christiani & Nielsen under the supervision of their general superintendent, Axel Wamberg.

Hector Minetti is vice-president of the cement company and is in general charge of all three plants. Felix Hesse, who is general superintendent, is, as well, in charge of the Dumesnil plant. Nicolas Araiz is manager in charge of sales, V. K. Newcomer is superintendent, and Victor Gurtler is chief chemist.

Separate Fluorspar, Zinc and Lead by Flotation

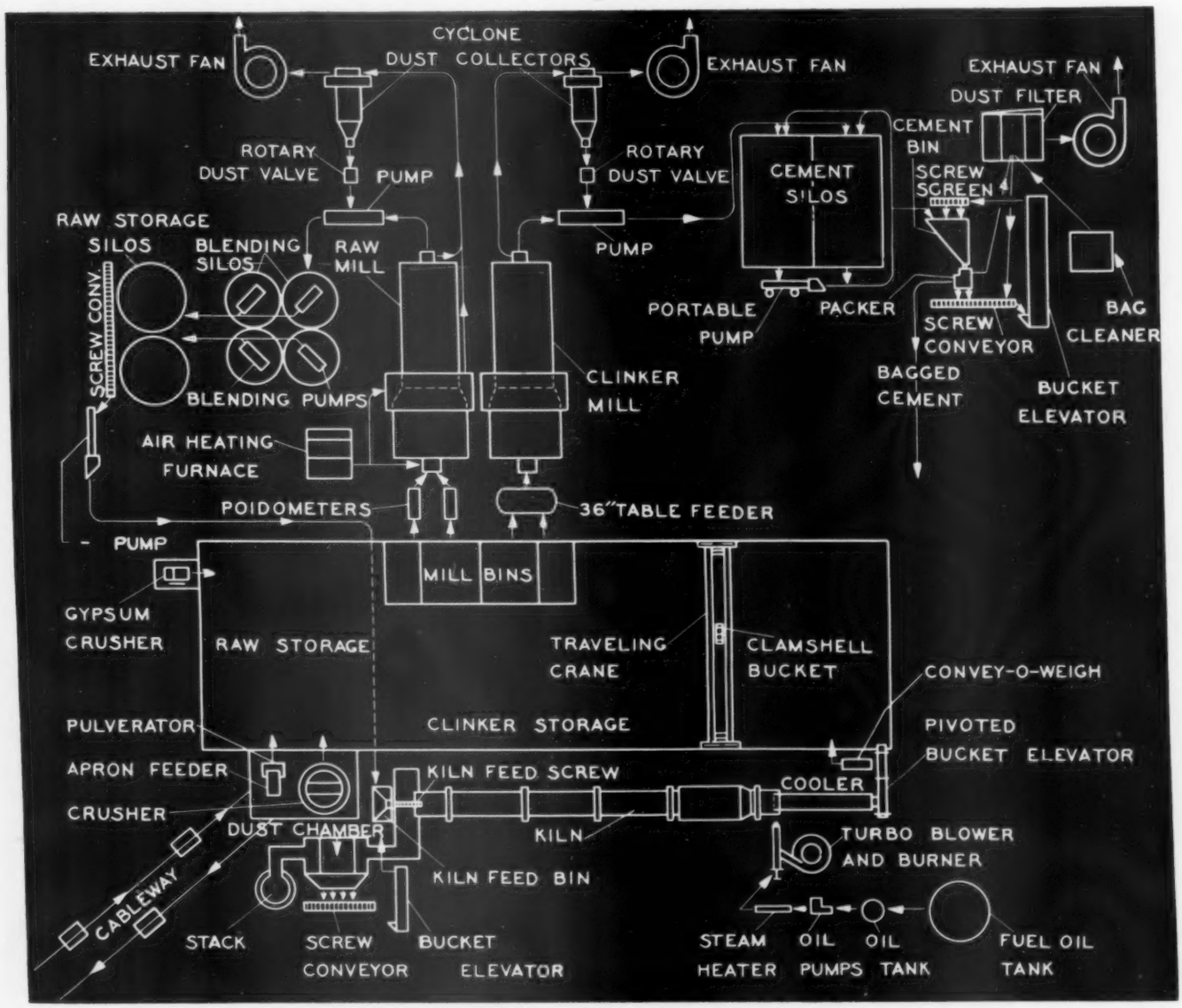
The unusual problem of separating three valuable products—fluorspar, lead and zinc—from a single ore by flotation has been solved and details of the process have just been published by the Bureau of Mines, as "Report of Investigations 3437."

High-grade fluorspar is demanded by the steel, ceramic, and chemical industries, while lead concentrates and zinc concentrates may be a profitable source of lead and zinc, if effectively separated from each other and from such gangue minerals as silica, calcite, and pyrite.

The aim of the Bureau of Mines investigators was to produce lead concentrates relatively free of zinc and fluorspar, zinc concentrates containing less than 1 per cent. of fluorspar and moderately free of lead, and fluorspar concentrates practically free of sulphides and containing at least 98 per cent. of fluorspar.

This objective was attained through investigations by the metallurgical Division of the Bureau of Mines in cooperation with the Mahoning Mining Co. of Kansas, and the Missouri School of Mines.

Conditions were established under which selective flotation produced the desired results. Quebracho, a crude tannin extract, was found to be very effective in the separation of fluorspar from sulphides, calcite, and siliceous minerals.



Flow sheet of operations.

By E. R. DAWLEY
Professor of Engineering Materials,
Kansas State College

Effect of TDA on the Rate of Grinding Portland Cement

THE Engineering Experiment Station of the Kansas State College of Agriculture and Applied Science located at Manhattan, Kan., has investigated the durability of concrete for about 20 years, during which time many admixtures for use with Portland cement have been tested. A general conclusion from all these tests has been: "If the price of the admixture were used to provide additional cement instead of the admixture, a better concrete would be obtained than would be possible by using the admixture." There have been a few exceptions to this general rule, notable among which is TDA which appears not only to improve the quality of the concrete, but is also a valuable aid in grinding cement clinker. TDA is described by its manufacturer, the Dewey & Almy Chemical Co., Cambridge, Mass., as a dispersing and catalytic agent. This company has, since 1935, maintained a research fellowship at Kansas State College.

Investigations under this fellowship have included the effect of TDA on the workability of mortar, and on the strength and durability of concrete made with various brands of Portland-cement, and also the use of TDA as a grinding aid. Portland-cement clinkers obtained from plants in the states of Nebraska, Kansas, Tennessee, and Washington were ground, both with and without TDA, in the modified Los Angeles Rattler shown in Fig. 1. This rattler, originally as specified in American Society for Testing Materials Designation C 131-37T, was modified as follows: The 3½-in. projecting shelf was removed. A ¾-in. diameter steel rod was inserted inside the drum parallel to the axis of the drum and ⅜-in. distance from the inside wall. The regular grinding charge consisted of four steel balls of 3¾-in. diameter, thirteen steel balls of 1¾-in. diameter, and 110 lb. of steel balls of 9/16-in. to ⅞-in. diameter. The drum rotated at 31.9 r.p.m. when empty. TDA, where used, was sprinkled on the clinker, using a 15-per cent. aqueous solution.

Clinker from Plant No. 1 was ground to various degrees of fineness with and without TDA and mixed with mine-run Ottawa sand in the proportions of 300 grams of the cement to 825 grams of the Ottawa sand. The amount of water required to produce a 15-mm. penetration of a 100-gram Vicat needle was determined experimentally. The results of this test are shown in Fig. 2.[1] The TDA cements here are seen to require less water to produce equivalent consistencies.

[1] Sollenberger (Norman J.). *The Effect of TDA on the Physical Properties of Concrete Produced from TDA Cement.* Unpublished thesis. Kansas State College.

[2] Adams (R. F.). *The Effect of TDA on Some of the Properties of Portland Cement and Concrete.* Unpublished thesis. Kansas State College.

The investigation of TDA as an aid in grinding Portland-cement clinker[2] was conducted in the mill shown in Fig. 1, using the clinker obtained from the plants mentioned above. The charge for the mill consisted, in general, of about 40 lb. of clinker, 1.8 lb. of crushed gypsum, 150 lb. of steel balls (shown in Fig. 1), and, where TDA was used, about 76.5 cc. of a 15-per cent. aqueous solution of TDA corresponding to about 1 oz. of TDA per sack of cement. Figs. 3, 4, 5, and 6 show the results of grinding clinkers from plants Nos. 2, 3, 4 and 5 both with and without TDA. These graphs show how the specific surface, the percentage retained on the 200-mesh sieve and the percentage retained on the 325-mesh sieve vary with the number of revolutions of the mill. It will be noticed

Fig. 1. Modified Los Angeles rattler used in grinding cement clinker.

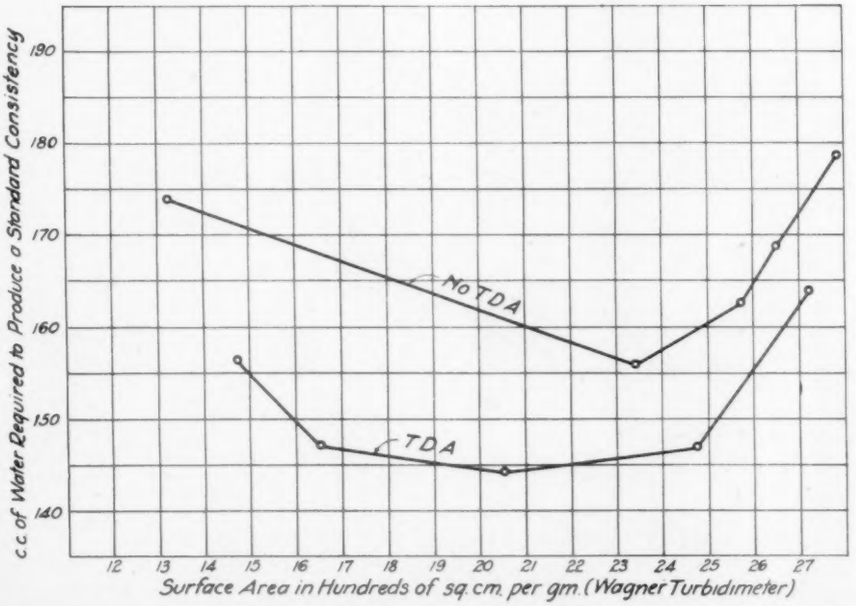


Fig. 2. Curves showing the effect of TDA on the workability of mortars using cements made from Clinker No. 1 ground to various degrees of fineness.

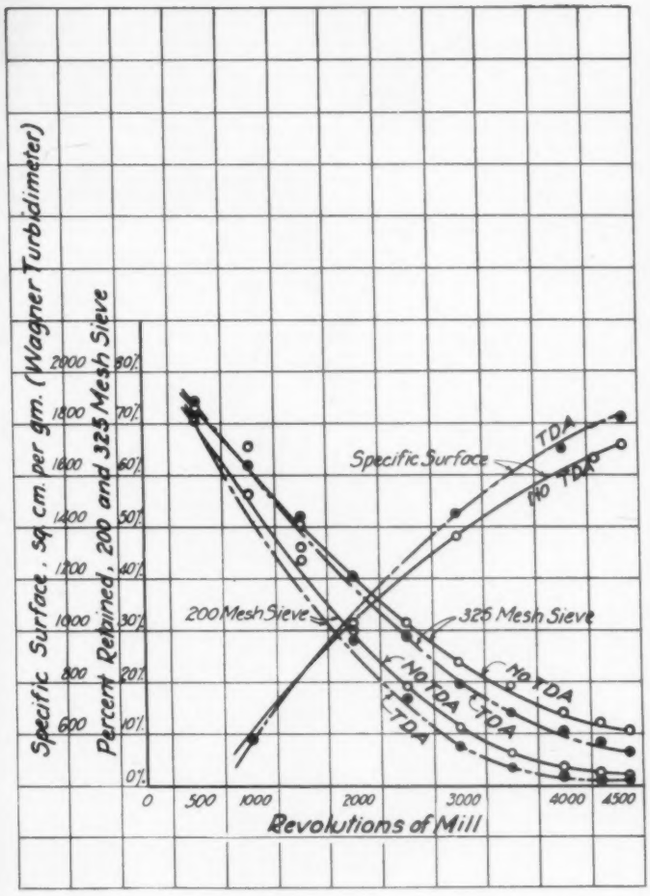


Fig. 3. Grinding curves, Clinker No. 2.

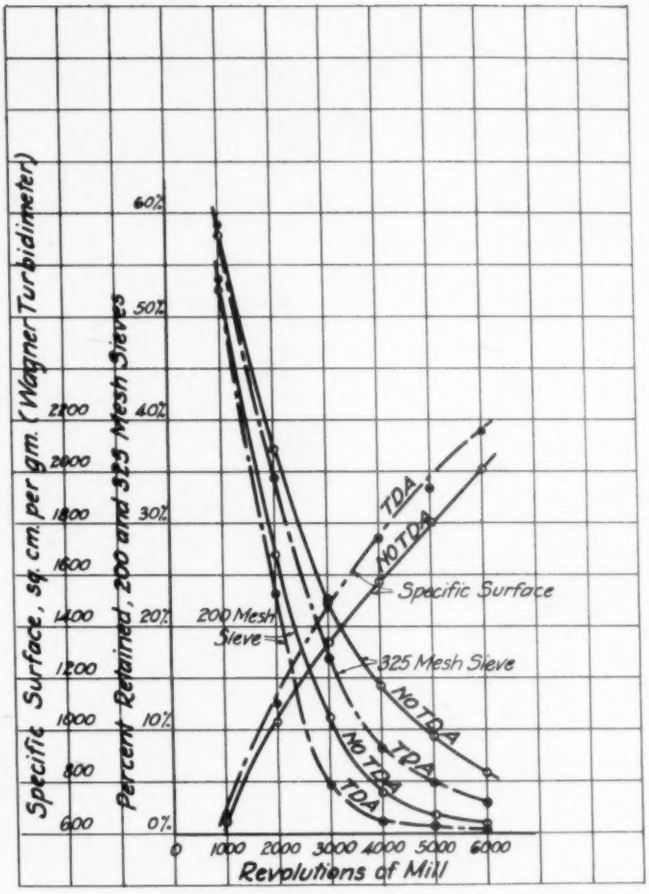


Fig. 4. Grinding curves, Clinker No. 3.

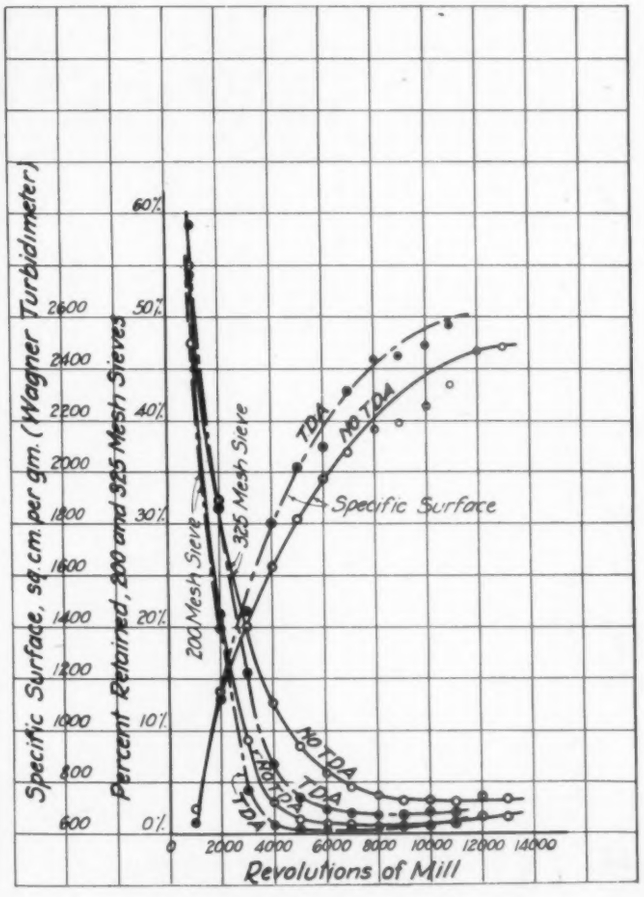


Fig. 5. Grinding curves, Clinker No. 4.

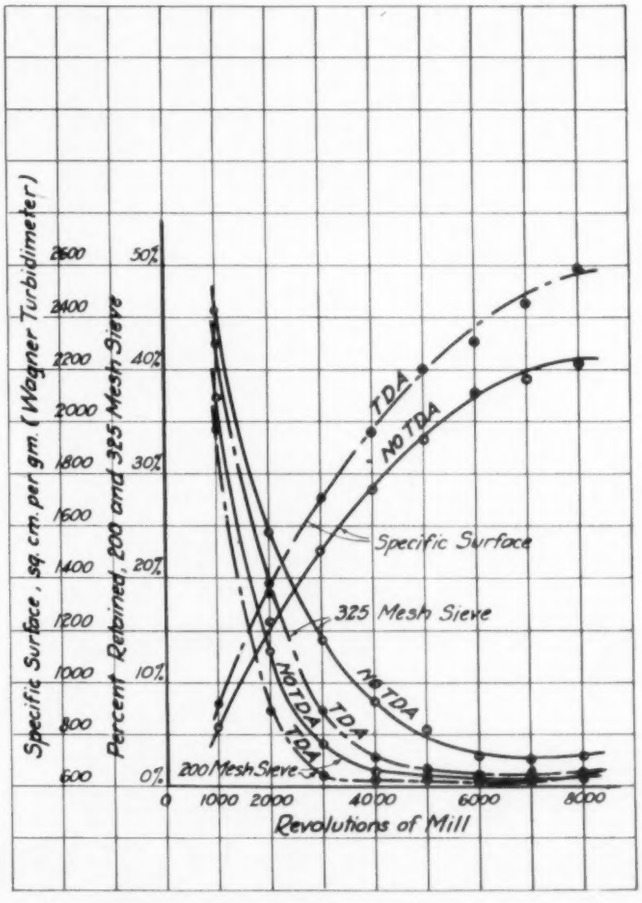


Fig. 6. Grinding curves, Clinker No. 5.

Table 1.—GRINDING RESULTS

Cement	Weight of Grind Balls (lb.)	Weight of Clinker (lb.)	Gradation Factor Before Grinding	Weight of Gypsum (lb.)	15% TDA Solution (cc.)	Revolutions of Mill	Percentage Retained 200-Mesh Sieve	Percentage Retained 325-Mesh Sieve	Specific Surface (sq. cm. per gram)
Clinker No. 6	150	40	3.17	1.8	0	4,000	1.25	10.25	1,740
Clinker No. 6 plus TDA	150	40	3.17	1.8	76.5	4,000	1.0	8.1	1,850
Clinker No. 7	150	40	3.35	1.8	0	7,000	2.65	13.8	1,775
Clinker No. 7 plus TDA	150	40	3.35	1.8	76.5	7,000	1.6	10.5	1,905

that the effect of this quantity of TDA was greater with some brands of clinker than with others but that within the useful range of specific surfaces the TDA cement was always ground finer by any given number of revolutions of the mill. Fig. 7 shows similar data for clinker No. 1, except that the grinding charge was 240 lb. instead of 150 lb. However, for comparison, the two light lines represent the 325-mesh fineness with the 150-lb. charge. This graph also shows that comparatively little advantage is lost by using half the regular amount of TDA or about ½ oz. per sack of cement.

Table I gives grinding data for two additional cement clinkers. The advantage of TDA is clearly shown by the increased fineness at the same number of mill revolutions. Of interest here also is the high number of mill revolutions required to grind clinker No. 7 to ordinary fineness. (*Continued on page 63*

Table II.—DATA ON CONCRETE USING ELGIN AGGREGATE AND LABORATORY-GROUND CEMENTS

Cement	Specific Surface (sq. cm. per gram)	Mix by Volume	W/C by Volume	Slump (6-in. cone)	Weight (cu. ft. per lb.)	Cement Factor (bbl. per cu. yd.)	Compressive Strength (lb. per sq. in.) Average of three 3-in. by 6-in. Cylinders 1 day	3 days	7 days	28 days	3 mo.	6 mo.
Clinker No. 2	1,725	1:4.0	0.80	1½	155.3	1.62	705	2,429	3,706	5,147	6,528	6,768
Clinker No. 2 plus TDA	1,740	1:4.5	0.80	1⅛	153.8	1.46	801	2,708	4,444	5,863	7,251	7,479
Clinker No. 2 plus TDA	1,740	1:4.0	0.75	1½	154.0	1.61	1,113	2,870	4,387	6,291	7,872	8,044
Clinker No. 2 plus TDA	1,830	1:4.75	0.80	1	154.6	1.40	1,184	2,575	4,420	5,793	7,639	7,703
Clinker No. 2 plus TDA	1,830	1:4.0	0.72	1	155.1	1.63	1,569	4,174	5,307	7,764	8,346	8,341
Clinker No. 3	1,570	1:4.0	0.80	1⅜	156.2	1.62	626	1,875	3,383	5,109	6,462	6,566
Clinker No. 3 plus TDA	1,770	1:4.75	0.80	1	154.9	1.41	1,026	2,900	4,350	6,579	7,889	7,455
Clinker No. 3 plus TDA	1,770	1:4.0	0.72	1	155.7	1.63	1,622	3,585	4,730	6,742	8,535	8,522
Clinker No. 4	2,390	1:3.5	0.80	1¾	154.2	1.78	1,137	3,427	5,171	6,432	7,335	7,339
Clinker No. 4 plus TDA	2,400	1:4.0	0.80	2	154.1	1.60	1,316	3,825	5,534	6,735	8,001	7,974
Clinker No. 4 plus TDA	2,400	1:3.5	0.75	2	154.4	1.79	1,403	4,011	5,483	7,604	8,455	7,957
Clinker No. 5	2,310	1:4.0	0.80	1¾	155.2	1.61	1,296	3,691	5,168	6,487	6,847	7,420
Clinker No. 5 plus TDA	2,290	1:4.5	0.80	1¾	154.1	1.46	1,610	4,571	5,399	6,865	7,641	7,840
Clinker No. 5 plus TDA	2,290	1:4.0	0.75	1¾	154.6	1.62	1,743	4,873	6,036	7,325	7,937	8,000
Clinker No. 5 plus TDA	2,430	1:4.5	0.80	1¾	154.6	1.46	2,293	4,690	5,870	6,878	7,757	8,090
Clinker No. 5 plus TDA	2,430	1:4.0	0.75	1¾	153.9	1.61	2,381	4,910	6,385	7,180	7,984	8,120

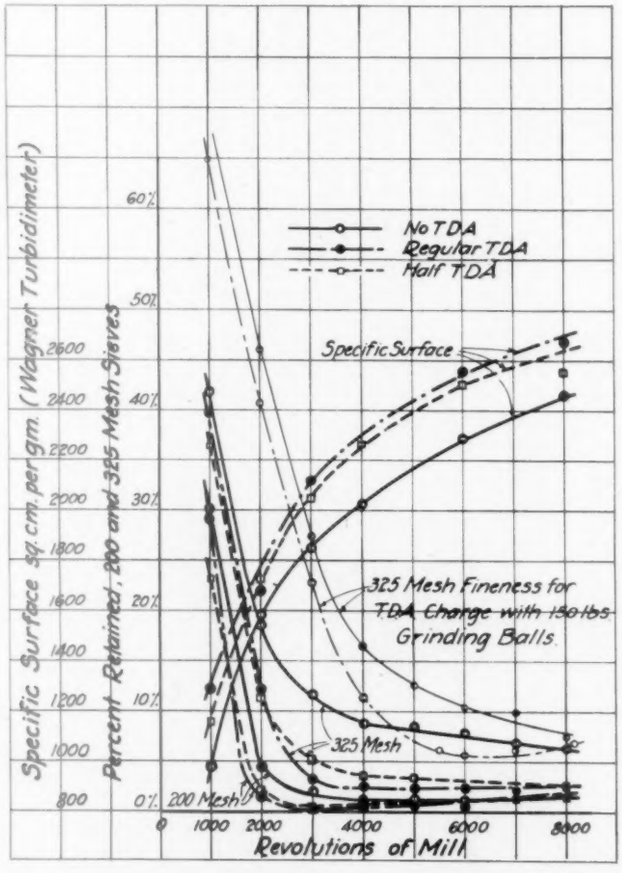


Fig. 7. Grinding curves, Clinker No. 1 with heavy grinding charge.

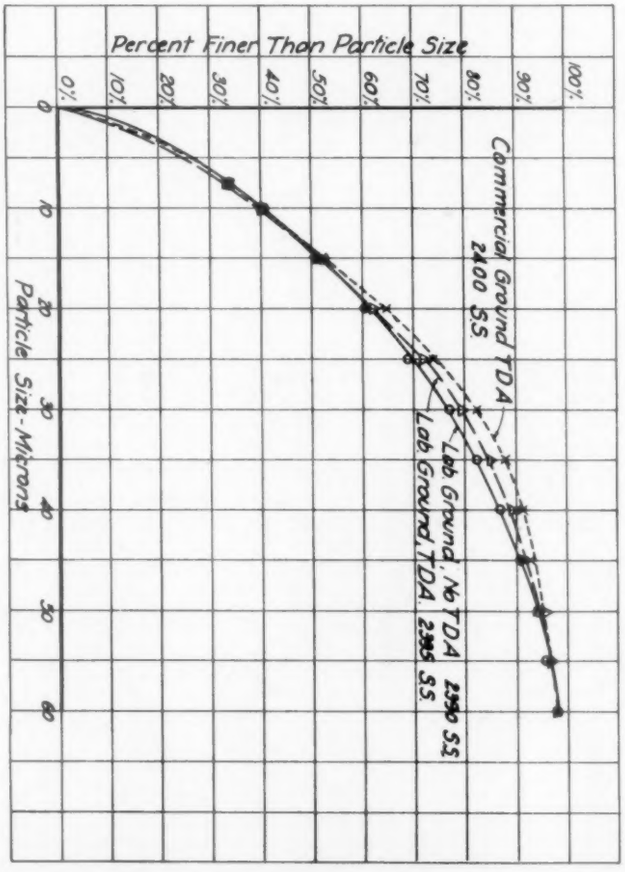
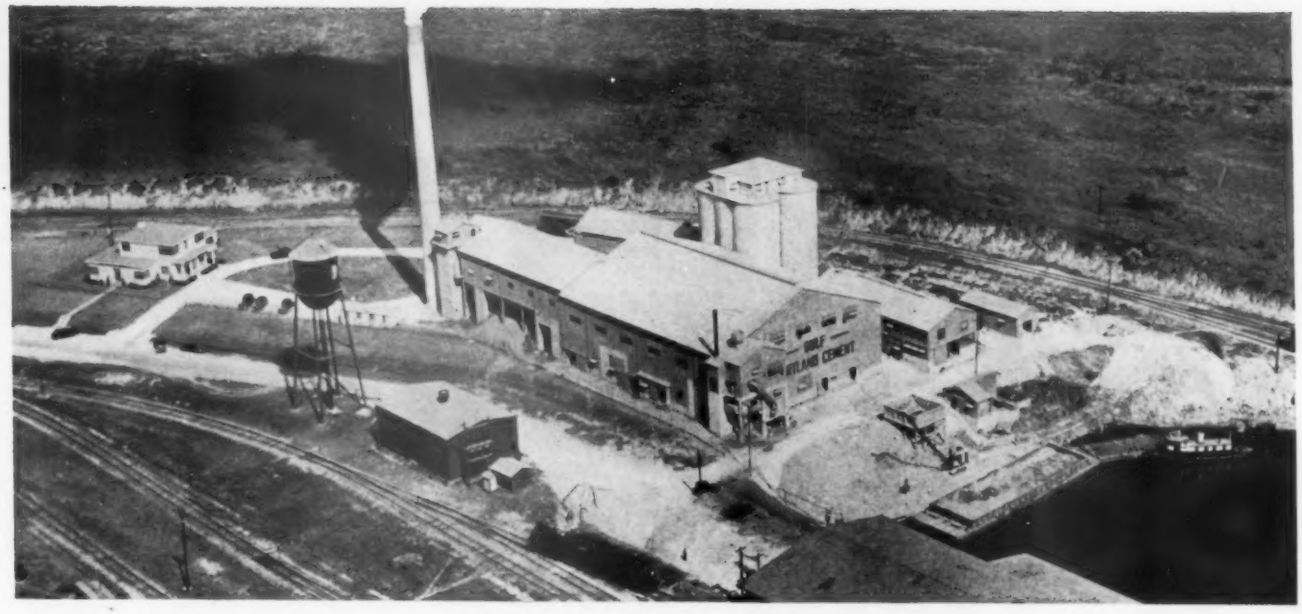


Fig. 8. Comparison of particle-size distribution of laboratory and commercially-ground clinker from Plant No. 4.



Aërial view of the plant of the Gulf Portland Cement Co. The dock is at right and office is at extreme left.

Gulf Cement Plant at Houston, Tex. Completes First Year of Operation

IT is now more than a year since the new wet-process plant of the Gulf Portland Cement Co. at Houston, Tex., went into operation. In that period the usual early difficulties have been overcome and improvements made both to the inside and outside of the plant. The result is a smooth and efficient operation which in appearance is also an asset to the community. The designed capacity of 800 bbl. daily for this plant has been demonstrated. Aside from the fact that this was the only completely new plant built in 1938 it is of interest to the industry because it represents a type of plant which may play an important part in the future expansion of the industry.

This plant is located on the Houston Ship Channel about 10 mi. east of downtown Houston. The raw materials used are oyster shell and clay. Closed-circuit grinding is used in both the raw material and clinker-grinding departments. The plant is compact in design and the number of operating units has been kept small. The plant is a very efficient operating unit and compares favorably with plants of much greater capacity in respect to costs, power consumption and man-hours per barrel.

The standard "Gulf" Portland Cement produced has a specific surface area of about 1,900 sq. cm. per gm. The initial set occurs in about 2½ hr. and the final set in about 5 hr. Tensile strength tests average 180 lb. in one day, 425 lb. in 7 days, and 480 lb. in 28 days. Plastic mortar compression tests average 850 lb. in one day, 3,800 lb. in 7 days and 5,600 lb. in 28 days. The company also makes a "Gulf Special" cement which has a specific surface area of about 2,400 sq. cm. per gm.

An average analysis of the washed shell is as follows:

	Per Cent.
SiO_2	1.50
R_2O_3	.50
CaO	53.80
MgO	.25
Loss	43.21

The clay analysis averages:

	Per Cent.
SiO_2	51.00
Fe_2O_3	5.25
Al_2O_3	15.00
CaO	10.00
MgO	2.50
Loss	15.10

An average standard Portland cement analysis shows:

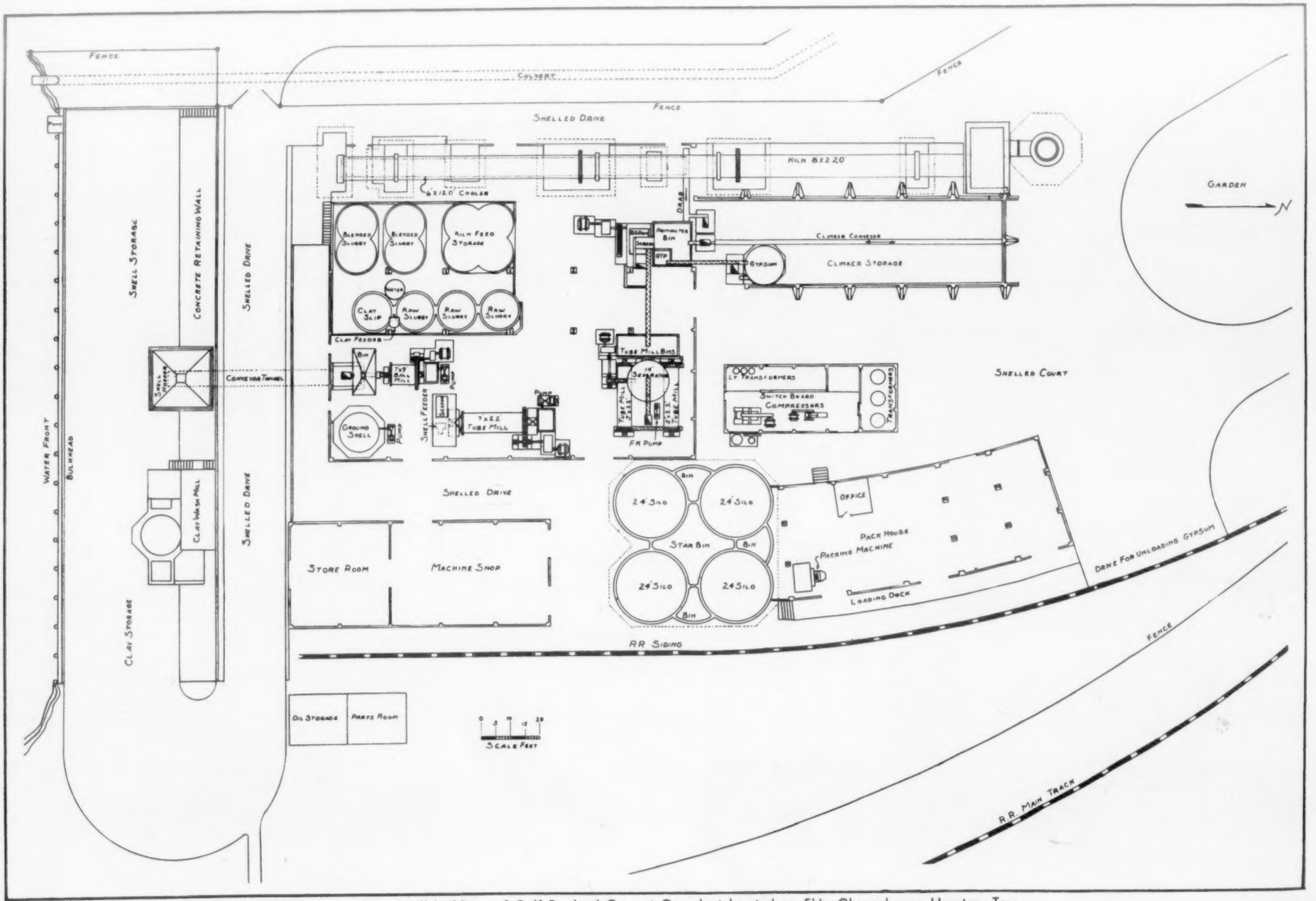
	Per Cent.
SiO_2	21.60
Fe_2O_3	2.30
Al_2O_3	5.60
CaO	65.80
MgO	1.50
SO_3	1.90
Loss	1.00
Free Lime	1.20

The oyster shells for this plant are supplied by Horton & Horton and are dredged from reefs in Galveston Bay about 50 miles from the plant. They are washed and screened on the dredge and delivered to the plant in barges. The clay is purchased from the same firm, which has a deposit 3 miles from the plant, and is also delivered in barges. A Thew Lorain crawler crane, with a ⅝ cu.yd. clam-shell bucket and a Waukesha gasoline engine, is used to transfer the shell and clay either to stock-piles on the dock or to the plant flow.

The shell is discharged into a 300-cu.yd. bin, from which a Jeffrey apron feeder discharges them on a 16-in. by 58-ft. tunnel belt-conveyor. A 40 ft. Jeffrey chain-bucket elevator discharges the shell into a 50-cu.yd. steel raw-mill feed bin.

Clay is fed by the crane into a 16-ft. diameter wash-mill in which mechanical agitation is used. A 2-in. Wilfley pump transfers the clay slip, containing 52 to 55 per cent. moisture, to a concrete tank 13½ ft. in diameter, and 20 ft. high, agitated by air and circulated by a 2 in. Wilfley Pump.

A Jeffrey-Traylor 18-in. by 5-ft. vibrating feeder discharges the shell from the bin into the 7-ft. by 9-ft. Allis Chalmers wet-grinding ball-mill, which is charged with 15 tons of 3-in. steel balls and is driven at the rate of 20½

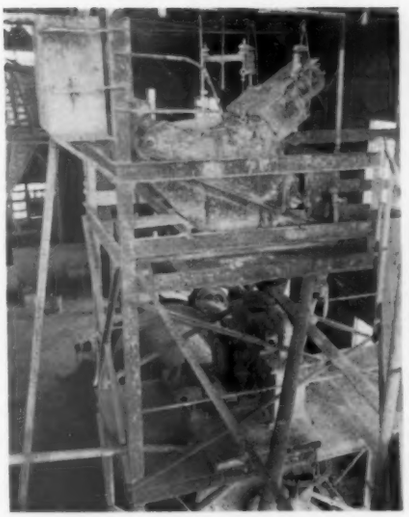


General plan of mill buildings of Gulf Portland Cement Co. plant located on Ship Channel near Houston, Tex.

r.p.m. by a 200-hp. motor through a Philadelphia herringbone gear reducer. The shell slip is discharged from this mill into a sump from which a 2-in. Wilfley pump feeds it to a 4-ft. by 7-ft. Jeffrey-Traylor electric vibrating screen with 14-mesh wire cloth on its single deck. Water is used to wash the screen "rejects" back into the mill. This mill has a capacity of about 60 bbl. per hr. and operates under a moderate circulating load. The shell slip passing through the screen is discharged into a 13½-ft. by 20-ft. steel storage tank. At this point the shell and clay slip are proportioned and fed to the 7-ft. by 22-ft. tube mill. The clay and shell slip are pumped to their respective

One of the two electric vibrating feeders and weighing devices serving the preliminary finish mill.

Kennedy-Van Saun ferris-wheel feeders the overflow returns to the separate storage tanks. The feeders are driven by d.c. motors and a common rheostat controls the rate of feed to the mill. An additional rheostat is placed in the line to the clay ferris wheel which changes the ratio of clay to shell



The electric-vibrating screen with ferris-wheel feeder above the raw tube-mill.

and can be changed only by the laboratory.

Due to the fact that the clay slip is practically all finer than 200-mesh material, it has been found more satisfactory not to add any clay at the ball mill and thus relieve the vibrating screen of the additional load of materials.

The tube-mill is charged with 35 tons of ⅞-in. and ⅝-in. steel balls and is driven at the rate of 23 r.p.m. by a 400-hp. slip-ring motor through a Philadelphia herringbone gear reducer. This mill has a capacity of 60 bbl. per hr. grinding to about 92 per cent. through 200-mesh. The slurry is discharged from this mill into a sump, from which a 2-in. Wilfley pump transfers it into any of three concrete storage tanks, each 13½ ft. in diameter and 20 ft. high. Air agitation is used, plus circulation by means of Wilfley pumps. Three Wilfley 2-in. pumps under these tanks can transfer the slurry into either of two slurry-blending tanks of identical size and construction or into a sixth tank used for kiln feed. These tanks are air-agitated and can also be circulated by means of pumps. The same pumps are used to feed from the blending tanks to the kiln-feed tank. All these tanks have conical bottoms and can be completely emptied.

Another 2-in. Wilfley pump transfers the slurry from the kiln-feed tank to a Kennedy-Van Saun ferris-wheel feeder, the overflow returning to the tank. The slurry has a moisture content of about 42.8 per cent.

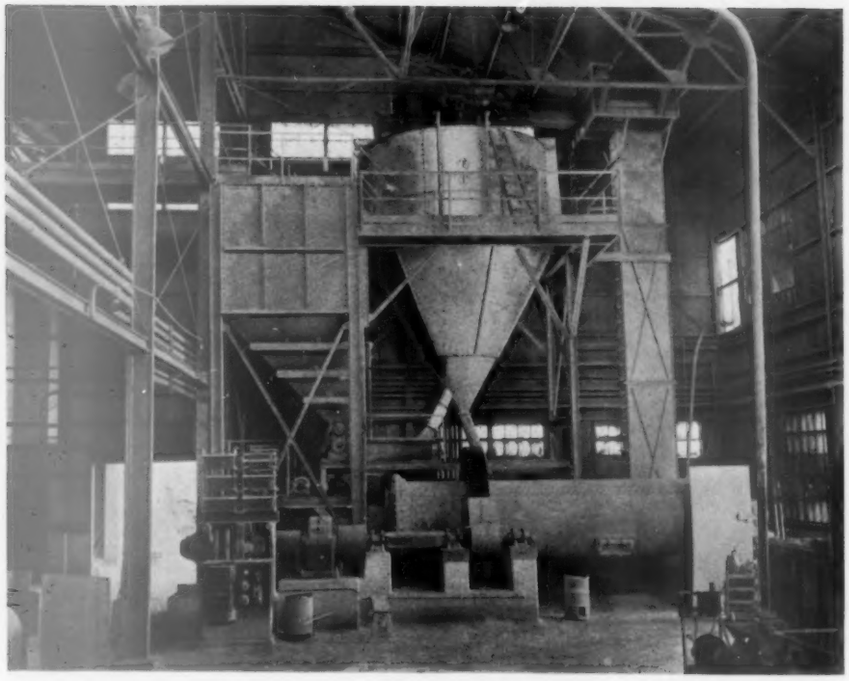
The 8-ft. by 220-ft. rotary kiln was made by joining together two 110-ft.

The raw-grinding department with tube-mill at left and ball-mill at right.

kilns, the two tires and the ring gear of each kiln remaining in place. It is driven by two 40-hp. Allis Chalmers electric motors synchronized through balanced resistors, each connected to a Philadelphia gear reducer and a train of gears. A generator on the kiln-motor shaft operates the kiln-feeder motor and keeps the kiln-feed in a predetermined ratio with the kiln speed. The feed ratio can be changed by means of resistors on the burner's platform and this can be done only by the chemist. The kiln shell has a slope of ⅜ in. to the foot.

A Huron seal ring is used at the feed end of the kiln. The kiln is lined with Mexico refractories and is equipped with chains for 60 ft. of its length at its feed end. The brick lining starts 15 ft. from the feed end with 60 ft. of cold-zone bricks and 90 ft. of 6-in. hot-zone blocks. The burning zone is lined with 60-ft. of 6-in. Mexico Aluminex bricks. At the discharge end of the kiln is a

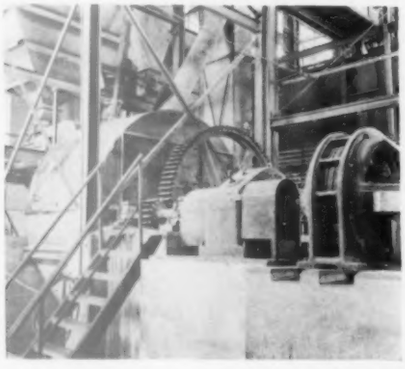
Clam-shell crane unloading clay from barges into the wash-mill. Barge-load of shells in background will be unloaded to bin.



The two tube-mil's used for finish grinding. These mills operate in closed circuit with the 14-ft. separator above.

7-ft. 8-in. section of 9-in. hot-zone blocks and a row of nose blocks.

The kiln is fired with natural gas ranging from 1060 to 1080 B.t.u. A modified Tate-Jones burner is used in connection with a 20-in. blast pipe. The primary air is preheated to approximately 500 deg. F. and the secondary air is drawn from the cooler. The fuel efficiency is very good and a clinker



The preliminary finish-grinding mill with feeders and drive.

containing less than .7 per cent. free lime is normally produced.

Primary air for combustion is drawn from the cooler through a Raymond 8-ft. cyclone by an American Blower Company 20,000-c.f.m. fan and enters the burner pipe at a temperature of about 500 deg. F. as stated above.

The kiln exit gas has a temperature of about 700 deg. F. The kiln operates under natural draft and is connected by a brick-lined concrete dust chamber to the 165-ft. concrete stack which has an inside diameter of 7 ft. Burning conditions are regulated through Tagliabue recording pyrometers for the primary air and exit-gas temperatures and an A. W. Cash automatically-controlled damper in the breeching between the dust chamber and the stack.

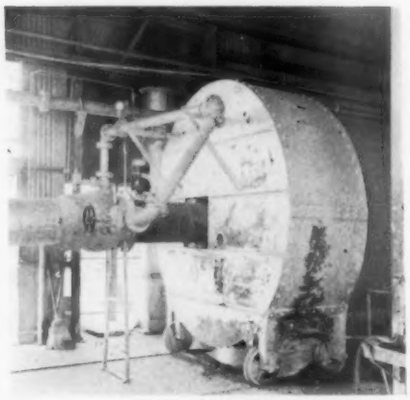
The clinker drops through a brick-lined chute into the 6-ft. by 120-ft. rotary cooler. This cooler is unusually long in relation to the kiln and was formed by joining together two 60-ft. coolers. Like the kiln, it has four tires and it is driven by a 20-hp. slip ring motor. The first 60 feet of the length of the cooler is lined with 4½-in. blocks and the remainder has channel lifters. The clinker is discharged at a temperature of about 150 deg. F. A Huron seal ring is used on the feed end of the cooler.

Fan which draws primary air for kiln from cooler through cyclone.

The cooled clinker is carried by a 6-in. Jeffrey drag-chain conveyor to a 50-ft. Jeffrey bucket-elevator. The clinker is discharged as desired either into the finish-mill feed bin or to the top flight of a Jeffrey drag-chain conveyor which distributes it in a 30-ft. by 100-ft. concrete-walled storage building with a capacity of 15,000 barrels. The clinker storage is designed so that the capacity can be increased whenever desired. The clinker is reclaimed from storage by the bottom flight of the same conveyor and is fed to an elevator for discharge into the 500-barrel kominuter feed bin.

Gypsum is received in cars from the Gulf Gypsum Co. plant at Falfurrias, Texas. Trucks are used to deliver the gypsum to a Jeffrey bucket-elevator which discharges it into a 13-ft. by 32-ft. steel tank in the corner of the clinker-storage building. The same elevator transfers the gypsum from storage into the kominuter feed bin.

Two Jeffrey-Traylor electric vibrating feeders followed by Jeffrey Waytrols control the rate of feed and proportions of clinker and gypsum for the F. L. Smidth No. 85 Kominuter which is



The kiln firing hood with burner used for natural gas.

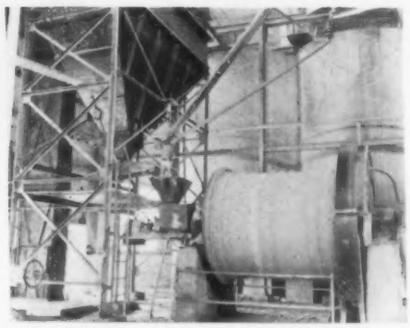
used for the first stage of grinding. Direct-current motors drive the weighing belts contained in the Waytrols. It is possible to maintain constant weight of material per foot of belt and by changing the ratio of belt speeds the SO_3 content of the cement can be held very uniform. A master rheostat increases the speed of each belt proportionately without changing the ratio of the clinker or gypsum belt speeds. Therefore, the mill operator can change the rate of feed to the Kominuter without upsetting the proportions of gypsum and clinker. Counters total the number of feet of belt that has delivered gypsum and clinker to the mill and from this record, accurate values are obtained as to the total number of barrels ground each shift. The Kominuter is driven by a 150-hp. motor through a Philadelphia herringbone-gear reducer. The mill is loaded with a

graded charge of forged steel balls weighing six tons with 4 inch the maximum size ball.

The Kominuter discharges directly into a Jeffrey 50-ft. elevator feeding a 4-ft. by 7-ft. Jeffrey-Traylor vibrating screen with 18-mesh cloth on a single deck.

The tailings are returned by gravity to the feed end of the Kominuter. The material passing through this screen is carried by 12-in. screw conveyors to feed bins over the two 5-ft. by 22-ft. finish grinding tube mills. The Kominuter operates under a circulating load of about 200 per cent. and grinds 60 barrels of clinker per hour.

The two 5-ft. by 22-ft. tube mills are

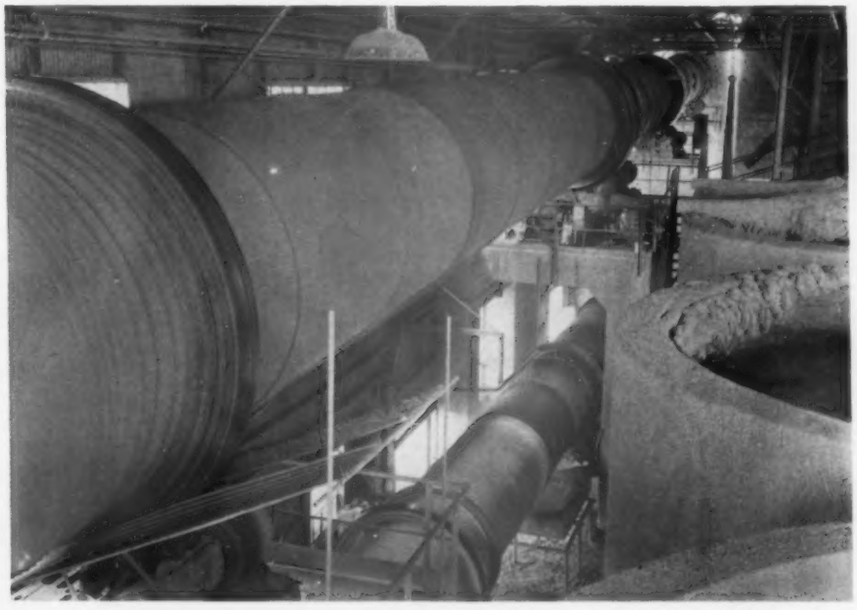


The ball-mill used for preliminary raw grinding with vibrating feeder above.

operated in closed circuit with a 14-ft. Raymond air separator of the double whizzer type. The tailings from this separator are discharged into a screw conveyor which delivers the rejects to a right- and left-hand screw conveyor set at right angles to it. The stream is split so that each mill receives half the rejects. The original feed is discharged from the bins through Fuller Co. No. 2 rotary feeders into the same

Mechanism for the automatic damper at the stack with indicator.

screw-flights carrying the tailings, which mix the feed and tailings intimately before they are delivered to each mill. The product of each of the tube-mills is discharged into the two flights of a right- and left-hand screw-conveyor. Both flights discharge at the center into a Jeffrey chain bucket elevator. This elevator discharges into a screw conveyor feeding the material into the separator. Each of the rotary feeders is driven by a 2-hp. motor direct-connected to a Reeves variable speed reducer. The tube mills are driven by 200-hp. motors through Philadelphia gear reducers. Each mill is loaded with 15 tons of 1¼-in. Concavex grinding media. The tube mills operate with a circulating load of about 200 per cent. and have a productive capacity of 1,400 bbl. per day.



The 8-ft. by 220-ft. rotary kiln with the 6-ft. by 120-ft. rotary cooler below. At right are the slurry tanks.

A 4-in. Fuller-Kinyon type H pump transfers the separator product (cement) into four reinforced-concrete silos, each 24 ft. in diameter and 60 ft. high inside. These silos, with their inclosed star bin, and three pocket bins, have a total storage capacity of 35,000 barrels. The silos have conical steel bottoms, the star bin has a sloped square steel bottom and the pocket bins have concrete bottoms. Cement is reclaimed from all these silos and bins by a 6-in. Fuller-Kinyon Type B portable unloader. Fuller Co. rotary valves are used under each of the eight openings and the pump is readily connected to any desired opening. This unloader pumps the cement either to a car-loading spout for bulk shipments or to a 150-barrel bin over the packer. A 3-tube Bates packer is now in use and space has been left for a second machine.

The company's offices and laboratories are housed in a building which is the last word in modern design. This building consists of two stories and a basement and was built of reinforced concrete, having a very pleasing appearance. The chemical and physical testing laboratories are completely equipped for making all the necessary tests. All-steel furniture is used. In

The 6-in. portable unloader which is attached to rotary valves under cement silos.

the chemical laboratory all the tables are rubber topped and in the physical laboratory stainless steel is used. The equipment includes a Southwark-Emery 75,000-lb. capacity compression machine, a Wagner Turbidimeter, a Cenco-Menzel autoclave, Shapco atmospheric cabinet, an Olsen briquette testing machine, and the other usual appliances. Each department in this building is to be separately air-conditioned.

Complete machine and repair shops are located in one building, which was the first to be completed. The equipment includes three lathes, two drill presses, a power hammer, a key seater, a bolt machine, a shaper, a forge, etc. This building and equipment were invaluable in the erection of the plant buildings and machinery and in the fabrication of the structural steel and incidental equipment used.

Here's why it's important to have a SINGLE SUPPLIER for a complete Cement Plant —

The more equipment bought from one manufacturer, the fewer your troubles. When responsibility rests on one concern, there is no "passing the buck," and successful, efficient operation of your plant is bound to result. This is particularly true when the supplier has had over 40 years experience in furnishing all types of machinery for cement plants throughout the world.

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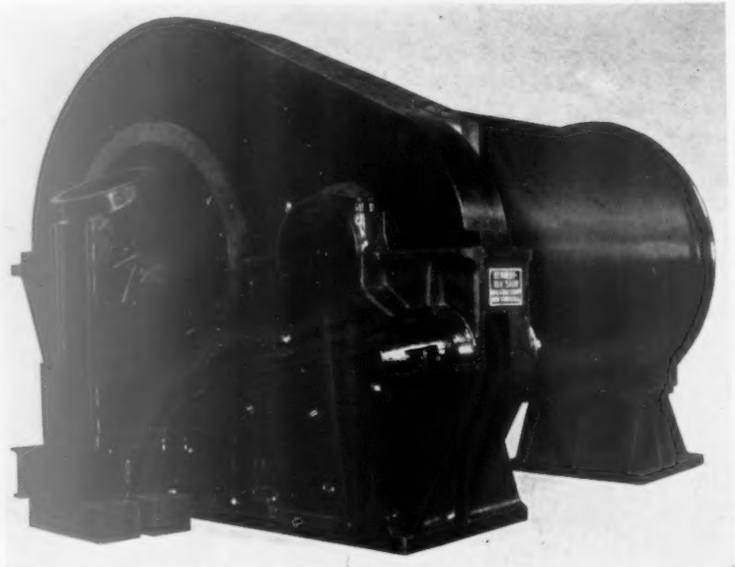

The Kennedy Air Swept Tube Mill for direct firing of boilers, kilns and all types of furnaces has long been recognized as the only pulverizer built that is capable of constant operation over long periods of time without shutdown. At one plant for 14 years six of these pulverizers have been in operation at absolutely no repair expense with the exception of the addition of necessary grinding balls.

With the Kennedy Air Swept Tube Mill 85% to 95% minus 200 mesh is easily obtained, and when pulverized to this fineness less coal is required to accomplish a given result than if a coarser product is used.

We have just completed shipment of 49 cars of integral gear driven tube mills, which we believe is the largest single shipment of this type of machinery ever made at one time.

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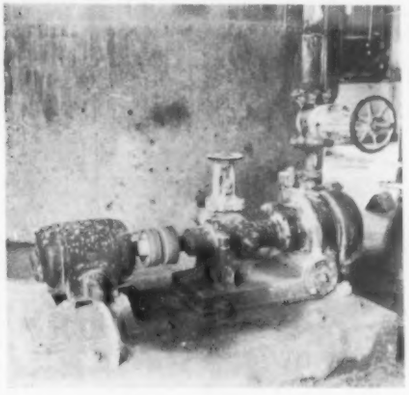
The electricity for operating the plant is purchased at 12,000 v. A concrete sub-station at the plant houses three Allis Chalmers transformers which reduce the voltage to 440 v. for all the motors. Three other transformers supply 110 v. current for lights. A 12-panel switchboard, a 600-cu.ft. Ingersoll-Rand compressor and a 250-cu.ft. Chicago Pneumatic compressor are also in this building. It is planned to install additional compressors. Motor generator sets supply direct current for the electric vibrating screens and feeders.

The electrical efficiency of this plant was formerly low because only induction motors were used. In improving the power factor, rather than install one or more synchronous motors, it was decided to use capacitors. Thirty-eight



The centrifugal pump which feeds slip to raw tube-mill feeder.

Cornell-Dubilier 540 k.v.a. capacitors were installed in various circuits about the plant. These have raised the power factor to over 90 per cent. and have

One of the two rotary finish tube-mill feeders with variable-speed reducer.

been very satisfactory. In addition to the low first cost, these capacitors have the advantage over synchronous motors that a high power factor is possible regardless of what parts of the plant are in operation. The total connected-electrical load is 1,800 hp.

The officers of the company are: F. M. Corzelius, president; Thos. B. Douglas, vice-president and secretary; H. I. Wilhelm, treasurer; Dan J. Morse, assistant secretary treasurer and traffic manager. Thos. B. Douglas is works manager and plant superintendent. Geoff. A. Saeger is chief chemist and assistant superintendent. J. F. Davidson is general mill foreman.

A view in the physical-testing laboratory showing compression and tensile-strength testing machines, atmospheric cabinet, etc.

The plant was designed by the Burrell Engineering Co. in coöperation with the Gulf Portland Cement Co. All the construction, both steel and concrete, was done by the Austin Bridge Co. under the Gulf company's supervision. This company also built the bulkhead and dock at the head of the slip. Concrete was used wherever possible and slip-form construction was used on the tanks, silos and the transformer house. Horton & Horton's 3,000-lb. ready-mixed-concrete was used throughout. All exposed concrete is finished for better appearance and all the steel is painted. Fenestra steel windows, Robertson ventilators, and Tennessee Coal, Iron & Railway Co. corrugated metal roofing and siding are used throughout. The Texas Concrete Chimney Co. built the kiln stack. Natural gas is purchased from the Houston Gulf Gas Co. and power from the Houston Lighting and Power Co.

New equipment was supplied by the following companies:

Fuller Co.—Portable 6-in. cement unloader, 4-in. Type H pumps, and rotary cement valves.

Huron Industries Co.—Seal rings for the kiln and cooler.

The attractive plant office and laboratory building.

Jeffrey Manufacturing Co.—Belt-conveyor idlers and drives and Jeffrey-Traylor electric vibrating screens, Waytrols and feeders.

Mexico Refractories Co.—All the kiln and cooler refractories.

Philadelphia Gear Wks.—The gear reducers driving the kiln, cooler, and grinding mills.

Raymond Bros.—The separator in the finish-grinding department and dust trap.

Thew Shovel Co.—The crane for handling clay and shell.

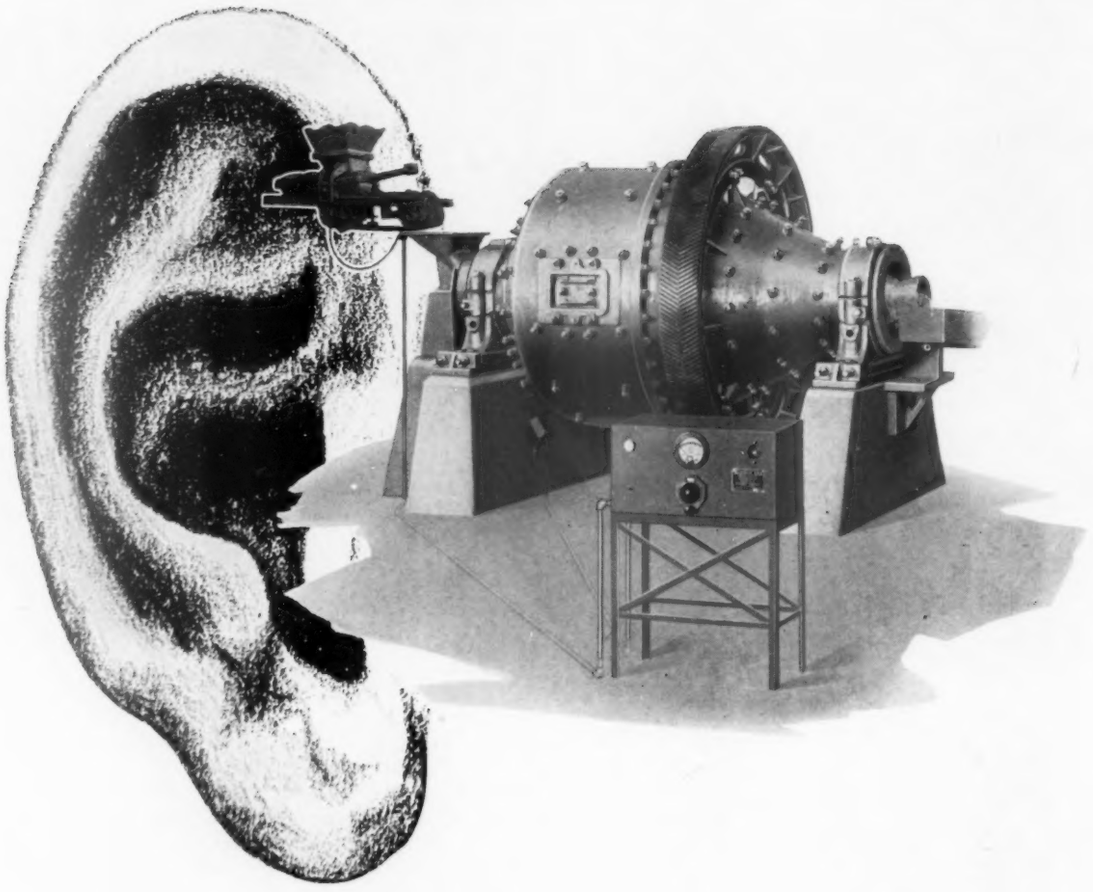
Wilfley Co.—The centrifugal pumps used to handle the clay slip and slurry.

Two Minerals of Barium Produced Commercially

Only two minerals of barium are produced commercially—barite ($BaSO_4$) and witherite ($BaCO_3$). Barite is also called "baryta," "barytes" and "heavy spar," and locally in Missouri, "tiff." Witherite sometimes is also called "heavy spar." More often it is simply called barium carbonate.

Pure barite is white opaque to transparent. Impurities sometimes give pale shades of yellow, green, blue, brown, red or gray-black to black. Barite crystallizes in the orthorhombic system. Twinning is common. The fracture is uneven and the mineral is brittle. Hardness varies from 2.5 to 3.5 and specific gravity from 4.3 to 4.6. Different localities are known to produce either "hard" or "soft" barite. The soft variety is more desirable for grinding. The streak is white. The luster is pearly to vitreous or sometimes stony. Theoretically barite contains 65.7 per cent. BaO and 34.3 per cent. SO_3.

Witherite is white, gray or yellow. It is transparent to translucent to opaque. The streak is white. It crystallizes in the orthorhombic system. It is brittle with uneven fracture.



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Hearing Aid for Grinding

SOUNDS unbelievable—but it's here! An automatic, dependable method of controlling the feed to your Mill and regulating it to maintain optimum operating conditions at all times.

The "Electric Ear" consists of a control cabinet with power relay to operate the feeder, and a microphone located close to the Mill. Only one adjustment is needed to regulate the noise level of the Mill. Capacity is increased over best possible manual control, usually in excess of 10%, because the "Electric Ear" compensates automatically for change in hardness, size segregation, or bulking of the feed.

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Write for Bulletin 42.

HARDINGE

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CONICAL MILLS	COUNTER CURRENT CLASSIFIERS	THICKENERS CLARIFIERS	RUGGLES-COLES DRYERS	CONSTANT WEIGHT FEEDERS	TUBE ROD AND BATCH MILLS

By ARTHUR WRIGHT
Louisville Drying Machinery Co.

Combined Filtering-and-Drying Process of Kiln-Feed Preparation

DRY-PROCESS cement plants with kilns of normal length have lower fuel costs than wet-process plants, even when the latter are equipped with filters for dewatering the slurry. Wet-process plants still enjoy the advantages of wet grinding and wet mixing, so that there is a place for a process that will make wet preparation as economical as the dry process, without the installation of long kilns. The Louisville drier process of raw cement preparation meets this need.

The introduction of continuous filters for the dewatering of cement slurry gave promise of reducing the fuel cost of wet processing, but the disadvantage of not being able to feed the filter cake in exact proportion to the rotative speed of the kiln and the fact that the filter cake tends to ball up and form mud rings in the kiln have proved barriers to the advance of filtration. In the past these difficulties have dimmed the hopes of converting dry plants to wet-grinding and wet-mixing mills. It was further expected that the filter-cake feed would reduce dust loss in the stack. But experience shows that there has been no appreciable reduction of dust over wet-slurry feed. However, dry-process plants offer no relief in stack loss, but generally are worse offenders.

The fundamental idea of the Louisville drier process is the conditioning of the feed to the kiln, so that dry plants need not change their kilns, and wet plants can enjoy a higher economy of fuel consumption, and both kinds of plants can operate with reduced dust loss in the stack. The first objective of this process is to produce a non-sticky product for the kiln. To prevent dust loss the product is prepared in a nodule form with a moisture content best calculated to keep down dust. The process comprises the use of the patented Louisville-Wright cord filter, and the patented Louisville Type L drier. The former is an automatic filter, and the latter operates with waste heat from the kiln.

The main feature of the Louisville-Wright cord filter is the fact that the filter medium does not plug up. With each revolution of the filter, the drainage and filter medium are washed clean. The filter is always clean—as clean as though a new filter cloth were put on a standard type of filter at each revolution. This fact eliminates scaling when handling slag with its free lime, which tends to carbonate on some types of filters and thereby plug up the filter medium. Maintaining an open and free filtering surface on the rotating drum is assurance against loss of capacity and higher moistures in the discharged cake.

Experience has shown that filters of 8-ft. diameter by 16-ft. face, or smaller units of 4-ft. diameter by 8-ft. face, have positive alinement of the cords, positive discharge of the cake, positive cleaning of the cords, and long cord-life. The cords are special woven, small diameter, and make a very rugged filter medium. Maintenance costs on the filter medium are low.

In the functioning of the Louisville-Wright filter one set of cords (the drainage cords) are laid upon the filter just in advance of the second set of cords (the filtering members) so that the second set fall on and tangent to the first set. The abutting cords form a porous filter medium at the edges of the cords, no reliance being placed on any filtration through the cords. The density of porosity is a function of the type of cord used, for with a twisted type of cord the pores are larger than when using a braided type of cord. The filtration through these cords is excellent with thick raw cement slurry. The dewatering effect is a function of the time

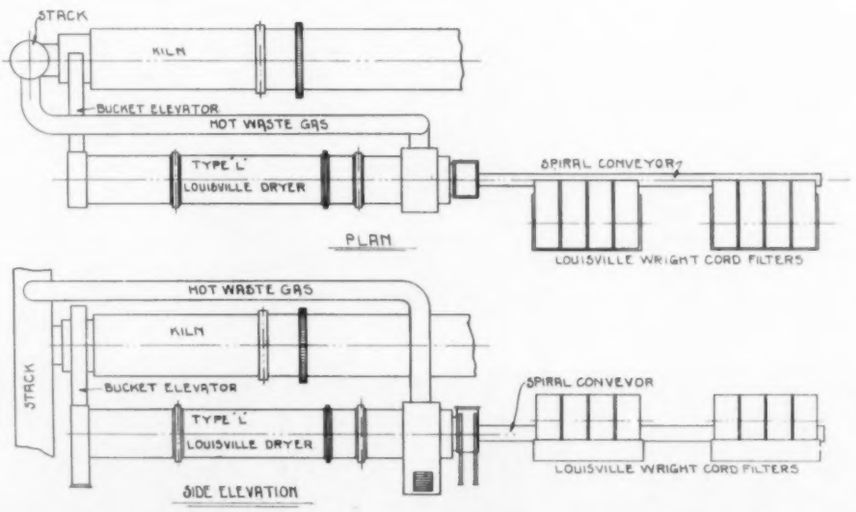
View of filtering cords at point of cake discharge.

the cake is above the liquor in the filter tank, and is proportioned so that the cake discharged from the filter contains less than half of the free water of the original slurry. The discharge of the cake is obtained without any reverse flow or "blow-back" on the discharging compartment, so that no liquid is forced back into the cake at the point of discharge.

The cake from the filter is fed to the patented Louisville Type L drier with a return of a certain amount of drier discharge, so that the product entering the drier does not ball up or ring up in the drier.

The Type L drier utilizes waste heat at 1,100 deg. F. or higher, and distributes the incoming hot gases around the interior of the drum, so that the shell of the drum is uniformly heated at the feed end of the drier. The ducts conveying the hot gases through the drier are open at the far end (the discharge

(Continued on page 63)



Plan and elevation views of filter and drier connected to a rotary kiln.

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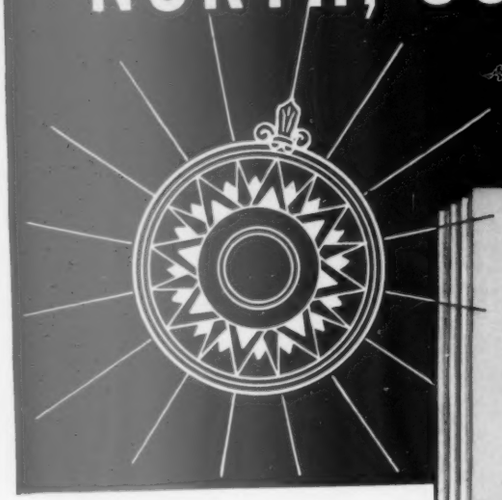
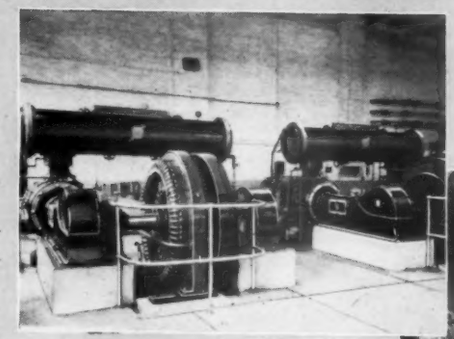
That G-E Equipment

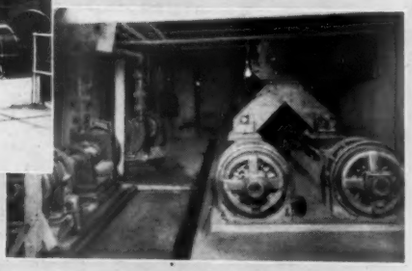


If you are considering building a new plant or installing new equipment in your present one, call in our nearest representative now. He will study your electrical problems and show you how G-E equipment can be applied to fill your requirements exactly. General Electric, Schenectady, N. Y.

Notes Made On

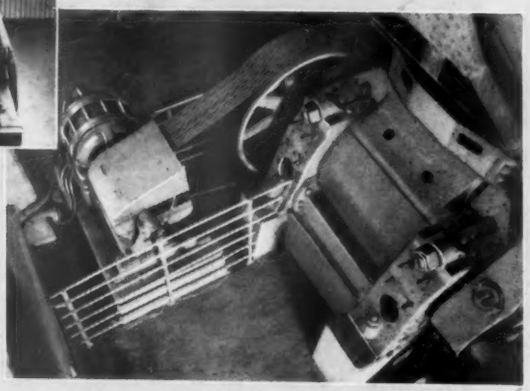


Two G-E 300-hp, 225-rpm synchronous motors driving air compressors in plant of Keystone Portland Cement Co., Bath, Pa.



G-E induction motors driving pumps at plant of Volunteer Portland Cement Company near Knoxville, Tenn.

G-E 40-hp induction motor driving belt conveyor in plant of Hudson River Stone Corp., Cold Spring, New York



G-E 200-hp wound-rotor motor operating rock crusher in plant of Nazareth Cement Co., Nazareth, Pa.

GENERAL

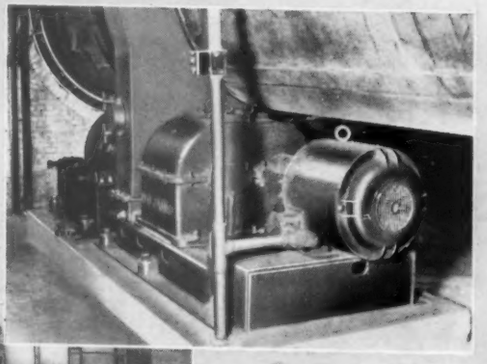
Filing No. 153

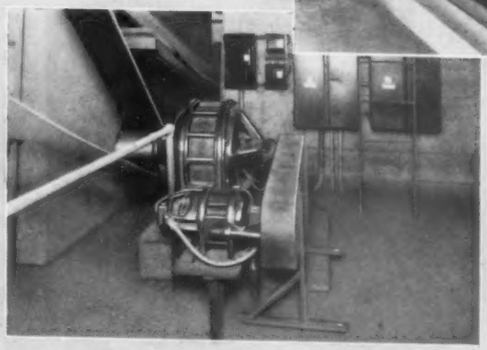
TRIPS TO MODERN PLANTS SHOW Helps the Rock-products Industry to Obtain

Plant Trips

G-E synchronous-motor controls, switchgear, and motor-generator sets in plant of Glens Falls Portland Cement Company, Glens Falls, N. Y.

G-E totally enclosed, fan-cooled, 20-hp, d-c motor driving rotary kiln through reduction gear in plant of Minnesota Mining and Manufacturing Co., Wausau, Wis.





G-E 50-hp, 900-rpm, wound-rotor induction motor driving a kiln, and G-E Selsyn transmitter for synchronizing speed of slurry feeder with kiln, in plant of Olympic Portland Cement Co., Bellingham, Wash.

1. Increased Plant Efficiency
2. Continuous Operation
3. Higher Return on Investment

HERE are pictures of General Electric equipment in some of the leading rock-products plants in this country. In each of these plants, G-E equipment is used extensively. It helps to make possible continuous operation, increased plant efficiency, and lower costs.

These plants are operated by progressive companies that recognize the aid given by modern machinery and up-to-date, properly applied electric equipment in obtaining a product uniformly high in quality and a higher return on the investment.

It is our plan to take you with us on trips through the plants of other such companies during the coming year, and to give you further evidence of the wide acceptance of G-E equipment by the rock-products industry.

GENERAL ELECTRIC

011-323

RAYMOND'S

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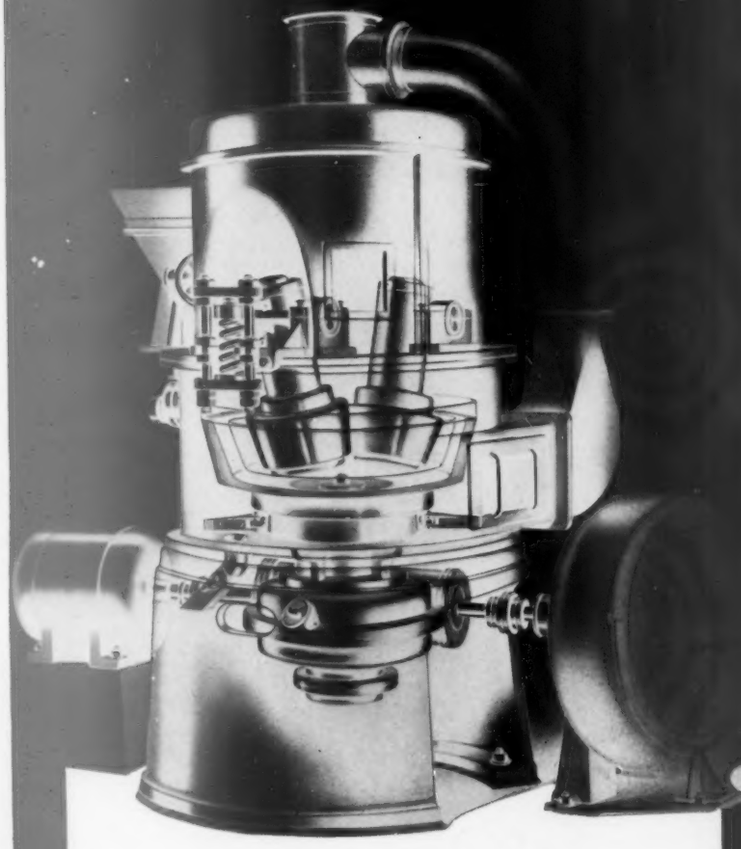
Quiet

AND EFFICIENT AS A....

Streamliner



Still greater economies are in store for operators using the modern Bowl Mill . . . today's finely engineered unit for direct firing rotary kilns. It reduces *total* coal preparation costs . . . power, labor, maintenance . . . to record-breaking lows that mean extra profits for lime and cement men. Only the Bowl Mill combines these five famous features:

1. **Silent, vibrationless operation**
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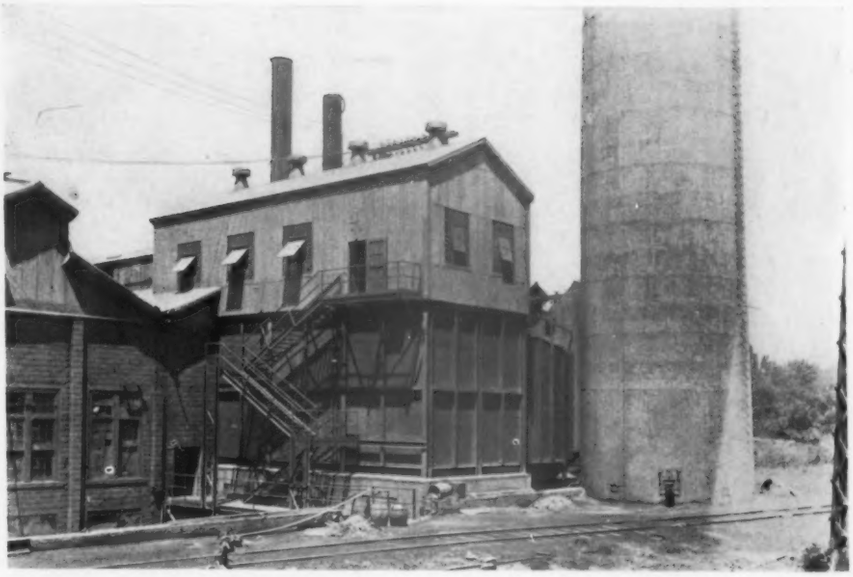


New Type Recuperators Added at Medusa's Dixon, Ill., Plant

By W. E. TRAUFFER

LEFT: The electrical precipitator which removes dust from kiln gas after it leaves boilers. Stack at right. BOTTOM: A view of plant with raw blending silos, stack, and cement-storage silos.

THE history of the plant of the Medusa Portland Cement Co. at Dixon, Ill., might almost be called a history of the progress of the cement industry in this country. The eight 8-ft. by 100-ft. rotary kilns installed when the plant was built in 1907 were among the largest in use at that time. This plant was also one of the first in which waste-heat boilers were used. The eight original 325-hp. natural-draft boilers were replaced in 1927 by three 1,000-hp. boilers with induced draft. Five Raymond mechanical separators were installed in the raw- and finish-grinding departments and two Bradley Hercules mills were added for finish grinding in 1937. A Fuller raw-material blending system was also installed. In July, 1938, a Western Precipitation Corp. Cottrell electrical precipitator was put in service to cleanse waste gases from the kilns. In May, 1939 Vanderwerp recuperators of a new type on the kilns went into operation. Other improvements made to this plant at frequent intervals have kept its efficiency well abreast of that of other plants in this area. This dry-process plant has a daily capacity of 5,000 bbl. of standard Portland cement, waterproof Portland cement and Brikset cement.

The quarry which supplies the stone and clay for this plant is about 1 mi. distant. Drilling, blasting and loading are done in the usual manner, well drills and shovels being used. Locomotives and cars haul these materials to the plant. Shale comes from Spring Valley, about 35 mi. south of Dixon. The clay is passed through rotary driers before going to storage.

Shale is added at the plant in the desired proportion on each car of stone from the quarry. A rather unusual system is used for "spotting," dumping and removing the cars in the crusher building. A car-puller moves each train of cars into position for dumping. Another car-puller moves the empty car to a transfer table. A third hoist transfers the table to another track paralleling the first. A ram operated by compressed air then pushes the car off the table and forms a train of "empties" to be hauled back to the quarry.

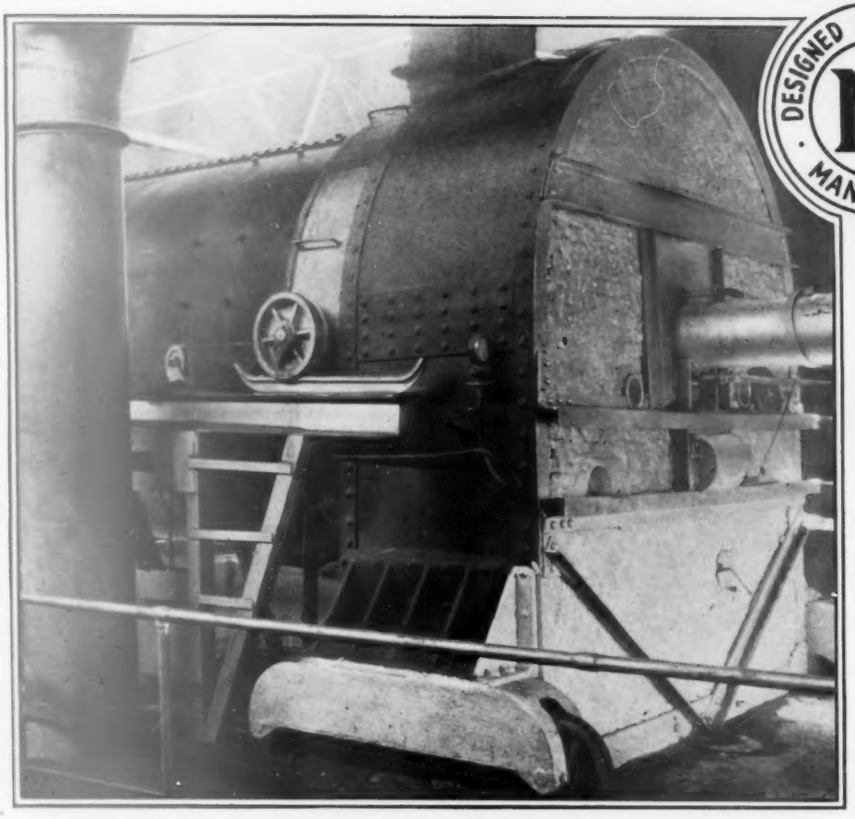
The stone is discharged on a pan-conveyor which feeds the Traylor 48-in. by 60-in. primary jaw crusher. A Williams No. 6 Jumbo hammer-mill is used for secondary reduction, after which the mixture of shale and stone goes to the driers. The dried material is fed to five No. 3 Williams hammer-

One of the 14-ft. separators in the finish-grinding department with its elevator.

mills and then passes to a storage building.

A 7-ft. by 26-ft. Allis-Chalmers Compeb mill and six 5-ft. by 22-ft. tube-mills are in the raw-grinding department. Two Schaffer Poidometers blend the clay with the mixture of shale and rock for the compartment mill and the tube-mills. The Compeb mill is in closed circuit with a 16-ft. Raymond air-separator. Two of the tube-mills receive fresh feed and their product goes to 14-ft. Raymond air-separators. Rejects from these separators go to two more tube-mills which also receive some fresh feed. The products of these mills go to the same 14-ft. separators.

The VANDERWERP "TYPE F" RECUPERATOR *for* Rotary Kilns



One of six Type F Recuperators installed at the Dixon, Ill., plant of the Medusa Portland Cement Co.

THE VANDERWERP TYPE F RECUPERATOR may be applied to any rotary kiln regardless of space limitations and the location of supporting tires on the kiln shell.

In this design first cost has been considerably reduced and installation cost greatly reduced.

Lubrication has been reduced to the application of lubricant to two points only, once per year.

The VANDERWERP RECUPERATOR offers the ultimate in rapid air quenching and efficiency of the heat exchange.

The Vanderwerp Recuperator insures:

- Improved Quality of Cement
- Better Grindability of Clinker
- Maximum Fuel Economy
- Highest Efficiency of Heat Recovery
- Low Maintenance Cost

Kiln operators interested in obtaining the maximum benefits from air quenching and heat recovery—with proven equipment—are requested to write, without obligation, for full particulars.

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The other two tube-mills are seldom used. Fuller rotary feeders and screw-conveyors feed these mills.

A Fuller-Kinyon dry raw-material blending system is used. A Fuller-Kinyon 10-in. pump feeds the finished raw material to four reinforced-concrete blending silos 23-ft. in diameter by 100-ft. high, and this pump is also used to transfer material from any silo to another in the blending process. Material is reclaimed from these silos by Fuller rotary feeders. Screw-conveyors feed an 8-in. Fuller-Kinyon pump which serves the kiln-feed bins. Any surplus raw material from these bins is returned by the 10-in. pump to the blending silos. Compressed air for the two pumps in this department is supplied by two Fuller Co. rotary compressors. These silos also act as reserve storage of kiln feed.

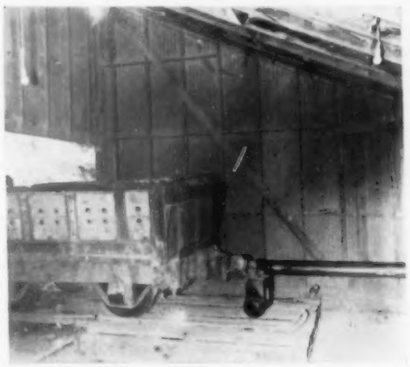
Only 6 of the original 8 kilns remain, and only 4 of these are ordinarily used. These were equipped with Pyrasteel kiln ends several years ago. Powdered coal is used as fuel. The six Vanderwerp recuperators recently installed are the latest short-plate Type F with three series of Pyrasteel plates totaling 42 in. in length. The cooling action is so rapid that most of the clinker is black before it has covered even this short distance. This type of recuperator has its annular wind-box at the end of the kiln between the end of the shell and the firing hood. No external air-lines are used. The valve and damper controls are on the front of the firing hood

A view inside one of the kilns showing recuperator plates and quick air-quenching action on clinker.

within easy reach of the burner. Air for each recuperator is supplied by an individual Clarage SP No. 60 fan.

Clinker is now discharged from the kilns at a temperature of about 800 deg. F. It then goes to 6-ft. by 60-ft. rotary coolers which it leaves at a temperature of 225 deg. F. The clinker is then conveyed direct to the finish-mill feed bins. Formerly the clinker was discharged from the coolers at a temperature of about 400 to 450 deg. F.

According to L. E. Smith, plant superintendent, the recuperators have already proved their value, although they have not yet been in operation long enough so that operations could be regulated to get the best possible results. The clinker can now be ground much more easily than formerly. This he attributes to the quick air-quenching due to the recuperators, which results in a brittle clinker. The installation of the recuperators, according to Mr. Smith, has resulted in an increase of 10 per cent. in the capacity of the preliminary-grinding Hercules mills and 30 per cent. in the finish grinding mills. Much of this increase in output is due to the lower mill temperatures resulting from the smaller amount of grinding



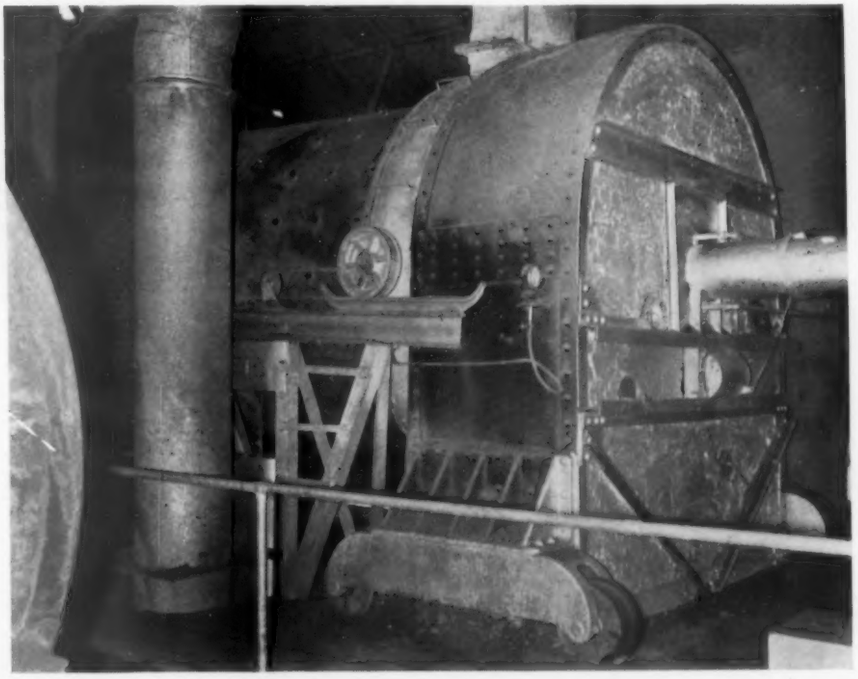
Air ram which pushes empty quarry car off transfer car between full and empty tracks.

necessary to reduce this clinker to the desired fineness. Another advantage is the fact that the burner can now see the clinker in the kiln in the dark stage. This makes it easier for him to judge its quality and if it is under- or over-burned the necessary adjustments can readily be made.

One of the rotary feeders under the raw-material blending silos.

The kiln exit gases now average from 1,700 to 1,750 deg. F. in temperature. The gases from all 6 kilns are now drawn into a common flue, to which the three 1,000-hp. Edgemoor waste-heat boilers are connected. Foster superheaters and fuel economizers are used, the gases leaving the economizers at a temperature of about 350 deg. F. The common flue makes it possible to operate any desired number of kilns without affecting the efficiency of the waste-heat boilers.

These gases pass through a settling chamber into the Cottrell precipitator, which consists of two units of three sections each. The dust collected in any of these sections and that from the



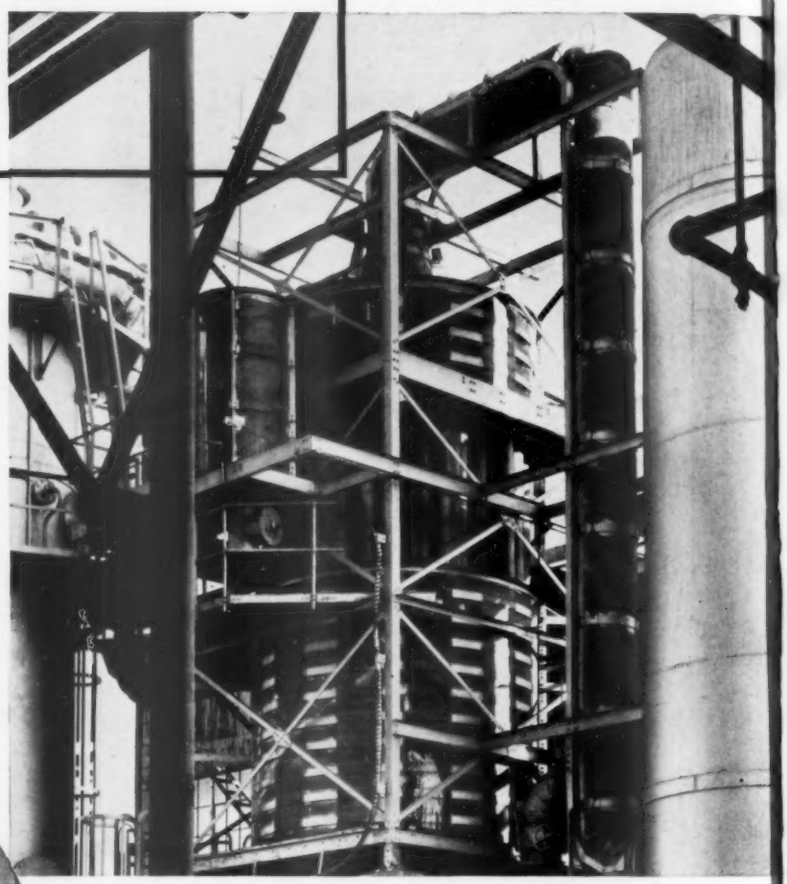
One of the new-type short-plate recuperators, one of six installed in this plant.

No other dust collector *can do* all that COTTRELL Electrical Precipitators *are doing* . . .

FIRST CHOICE ON ALL COUNTS

Long term durability results in lowest installation cost per year. Continuous economy in low draft loss, low maintenance and power consumption results in lowest cost per 100,000 cu. ft. of gas cleaned. Highest operating efficiency insures maximum collection of values or abatement of a nuisance, or both. Full automatic control reduces supervision expense.

Cottrells Collecting Acid Mist



The Cottrell Process of Electrical Precipitation is the only process that can collect ***anything*** suspended in gas—solid or liquid, including sub-micron particles of fog, fume or mist, at any temperature up to 1200° F. and to any desired efficiency.

First successfully used 33 years ago for the collection of acid mist, thousands of Cottrells are now operating in 31 countries all over the world, in every industry that has a dust problem: cement mills, pulverized fuel power plants, blast furnaces, smelters, paper mills, chemical plants, manufactured gas plants, oil refineries and miscellaneous process industries.

A COTTRELL GUARANTY HAS AUTHORITY

The performance of every Cottrell Electrical Precipitator is specifically guaranteed without evasion or subterfuge. A Cottrell guaranty is based on the percentage of collection of total solids entering the collector and is backed up by adequate financial resources and records of successful performance in all industries all over the world. In the long run, this is the only index of saving and safety.

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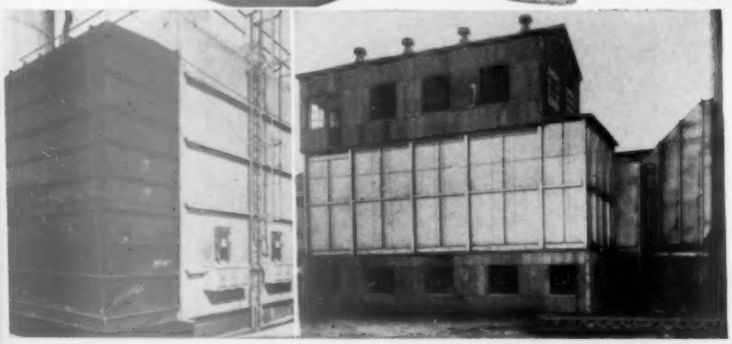

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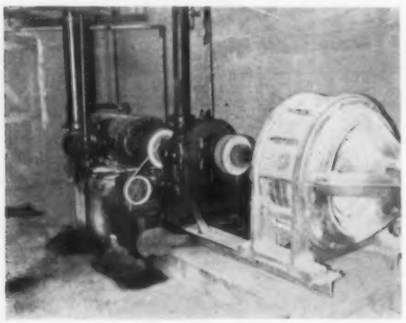
chamber can be returned to the kiln feed if desired. Each section of the precipitator has 13 ducts 8 in. wide by 18 ft. high and 8 ft. long in the direction of the gas flow. The precipitator exhausts to a 300-ft. Rust concrete kiln stack.

Tests made at the precipitator outlet show an efficiency of 95.8 per cent., and 103 tons of dust are being collected



Rotary compressor which supplies air for raw material handling and blending.

daily with only 4 of the 6 kilns in operation. Either of the two collector units can be operated separately if necessary, which is also an economy when fewer than 4 kilns are in operation.

The two Bradley Hercules mills used

The two mills used for preliminary grinding of raw material.

for preliminary grinding are equipped with 16-mesh screens and each is now producing 150 bbl. per hr. These mills are connected to a Parsons bag-type dust-collector. There are seven 5-ft. by 22-ft. tube-mills in this department and of these two are now used only for "Brikset" or waterproofed cements. Four mills are operated in pairs in closed circuit with two 14-ft. Raymond air-separators, the rejects from each separator being split back into the two mills feeding it. Another mill can be operated in open circuit or can take the place of any of the 4 closed-circuit mills which might be idle. Each of these mills is equipped with a Fuller rotary feeder.

The finshed cement goes to an 8-in. Fuller Kinyon pump from which it can be deposited into storage silos or into the original warehouse. This consists of many small tanks and space bins from which the cement is reclaimed by screw-conveyors and elevators. The six 50-ft. by 100-ft. reinforced concrete silos are among the largest in the industry and have a total capacity of 350,000 bbl. with their interstices. An 8-in. Fuller-Kinyon pump on a portable mounting is used to transfer cement from these silos to the packhouse. The latter building houses 6 Bates packers, of which 4 are used for standard Portland cement.

Filters (*from page 55*)

end), and the gases return through the unit counter-current to the advancing raw cement material.

This combination provides a maximum interchange of B.t.u., and minimum radiation loss, so that the moisture is removed at a high thermal efficiency (about 85 per cent.). The product showers down through the returning gases in the drier, and there is a considerable scrubbing effect of any solids in the gases by this action.

The discharged product is a small nodule approximating ¼-in. cubes and is fed to a hopper at the boot of a bucket-elevator. With a moisture of 10 to 11 per cent., it is not sticky, and the buckets can pick it up and discharge the product without any difficulty. The drive to the bucket-elevator is from the kiln; when the kiln burner changes the speed of the kiln, the feed of the raw product to the kiln is automatically changed. The feed is uniform at all times, whether the burner is running the kiln at low, intermediate, or high speed.

It will be appreciated that this combination of filter and drier is not located above the feed of the kiln, but can be located on the ground floor or any other convenient location. Getting the units away from the heat enables the operator to handle the unit without the physical strain that is so often encountered when the filters are located above the kiln.

The advantage of feeding a uniform nodule to the kiln in a slightly damp condition is apparent in the reduced dust-loss in the stack.

With the Louisville drier process the fuel cost of calcining and using raw cement approximates the cost obtained in good dry-feed plants. The nodulated product is an excellent conductor, so that calcination is not delayed and fusion is easily controlled. Utilizing waste heat from the kilns for the preparation of the nodules adds no cost for this part of the process.

Thus the Louisville drier process for raw cement preparation makes it possible to change dry plants to wet-grinding and wet-mixing plants without any change in the kiln, and enables wet-process plants to operate at a cost approximating dry-process plants, without using long kilns.

TDA (*from page 46*)

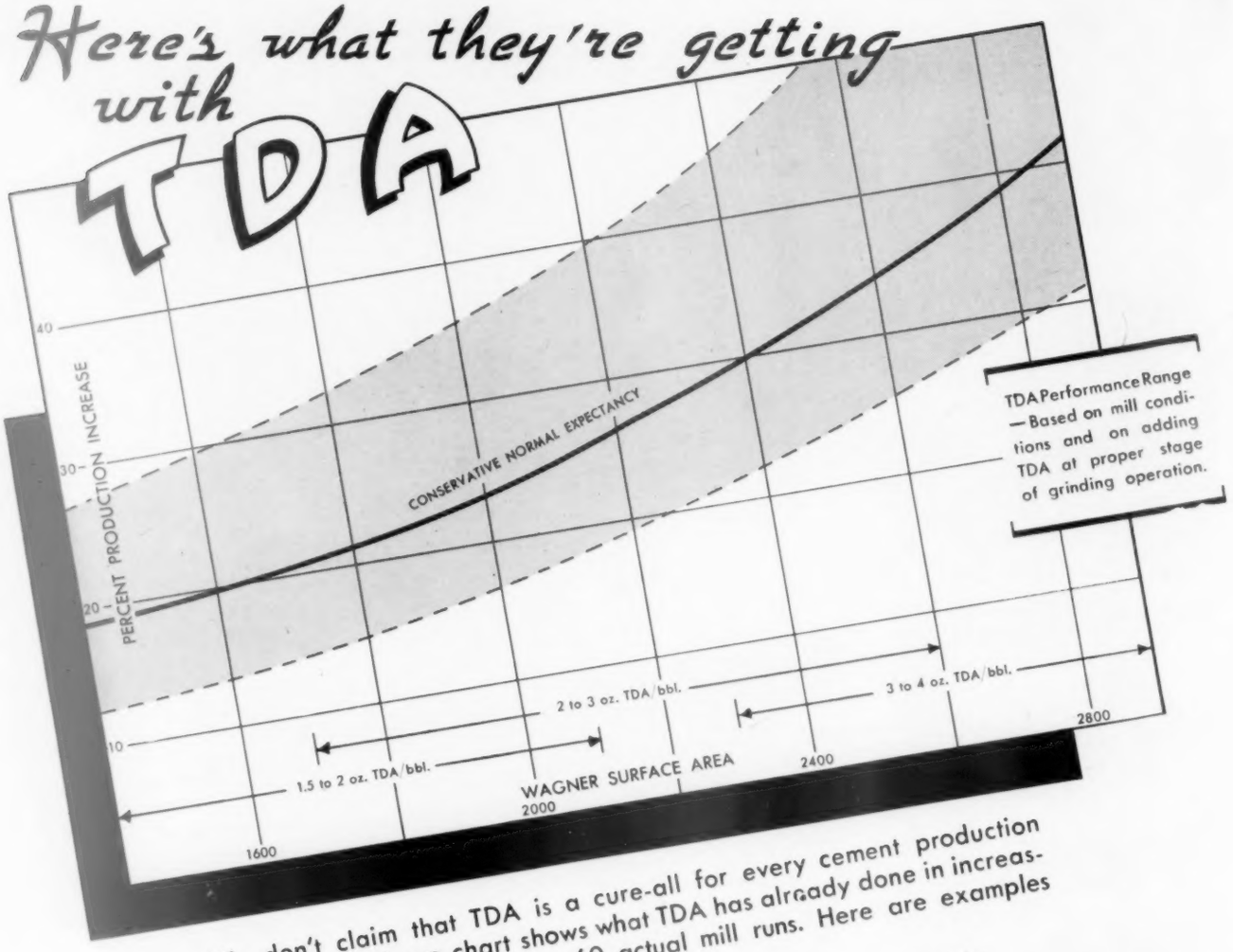
In order to compare the results of the laboratory grinding with cement-mill grinding determinations of the particle-size distributions were made of the laboratory grinds with and without TDA, and also of the regular commercial cements. Fig. 8 shows the results for clinker No. 4. There is little difference in the particle-size distribution of these cements.

Table II shows the results of the workability and strength tests. Space limitations prevent adequate discussion of the large number of data presented here, and it must suffice to say that both workability and strength are improved by the addition of TDA.

General Conclusions

1. TDA increases the rate of grinding of Portland cement. This allows an increase in the cement-mill output, or an increase in the fineness of the cement. An increase in the ratio of the weight of the grinding balls to the weight of the cement causes an increase in the grinding rate, and an increase in the effect of TDA. Reducing the amount of TDA by one-half does not appreciably affect the grinding results.
2. The use of TDA produces a cement that is normal in every way.
3. The air inclusions of the TDA cement are neglible, being less than 1 per cent.
4. Cements ground in the laboratory mill with and without TDA compare very closely in particle-size distribution.
5. The laboratory and commercial-mill ground cements compare very closely in particle-size distribution.
6. TDA causes an increase in the tensile strength, particularly at 1 and 3 days.
7. When compared with the corresponding Portland cements, TDA cements produce higher compressive strength and more workable concrete, from which it follows that TDA cements make concretes with identical mix and identical workability, but with a lower water-cement ratio, or concretes with identical water-cement ratio and identical workability, but with more aggregate. This results either in stronger or more economical concrete.
8. Additional strength can be secured from the increase in fineness caused by the TDA in grinding the cement.
9. There is no significant difference in the density of concrete made from cement with or without TDA.
10. TDA causes an increase in the durability or resistance to freezing and thawing of the concrete.

Here's what they're getting with TDA



We don't claim that TDA is a cure-all for every cement production problem, but the above chart shows what TDA has already done in increasing finish mill production in over 60 actual mill runs. Here are examples from three different plants:

Case No. 1: A plant operator grinding H.E.S. cement in open circuit increased his production 53%. He reports that, in addition, he got higher strength, greater workability, and fewer headaches.

Case No. 2: Another user of TDA, grinding H.E.S. cement in a closed circuit with an air separator, obtained a 28% increase in production. The efficiency of his separator was improved as well.

Case No. 3: A producer grinding in the low-surface-area range finds that TDA is giving him a 30% increase in production in open-circuit operation.

Maybe TDA won't do all this for you, but isn't it worth a trial?

Look at the chart again. At the fineness you're grinding you can select for yourself the average production increase you can expect with TDA in your mills. Doesn't this again justify a trial? Our engineers will be glad to cooperate in every way in discussing your particular problem. Write Dewey & Almy Chemical Company, 80 Whittemore Ave., Cambridge, Mass.

TDA

DEWEY & ALMY CHEMICAL COMPANY

CAMBRIDGE, MASS.

LONDON MELBOURNE OAKLAND MONTREAL

What is TDA

TDA is a mixture of triethanolamine salts and highly purified soluble calcium salts of modified lignin sulfonic acid. TDA is an excellent grinding aid. Its presence improves many of the important properties of concrete such as durability, strength and permeability.

View showing primary-crusher building under construction with conveyor to plant. Dumping hook is shown engaged to dump body.

Dewey Quarry Adopts Truck Hauling

THE Dewey Portland Cement Co. is one of the latest converts to the use of motor trucks for hauling raw materials from quarry to plant. On May 1, 1939, this company put in operation at Davenport, Ia., a fleet of trucks for hauling both rock and clay, replacing the rail haulage systems formerly used. The primary crusher, formerly located at plant level, was moved down into the quarry and a belt conveyor replaced the inclines to the secondary crushers.

The company had for many years been using locomotives and cars to haul clay to the plant. This clay formed part of the overburden on the deposit. Some time ago stripping reached a point far in advance of the quarrying operations and it was decided to use a deposit of higher grade clay about 1 mi. from the plant. The rail haulage system was extended to this deposit and a steam locomotive hauling six 10-ton dump cars was used.

The clay is now hauled by two International DR-50 trucks with Truck Engineering Co. "Aristocrat" Boulder Dam type end-dump bodies of 6-ton capacity. These trucks are equipped with hydraulic hoist dumps and Goodrich tires. They haul the clay over a recently complete roadway to the plant. Together they haul about 50 tons of clay per hour, dumping direct into the clay wash mill. As the plant requires only from 150 to 200 tons of clay daily the trucks are used for other miscellaneous work for the balance of the day.

The clay is loaded into the trucks by a P&H gasoline crane with a 1-cu.yd. Blaw-Knox clamshell bucket. While waiting for trucks the crane is used to cut a new diversion channel for a creek which formerly ran across the west end of the deposit and blocked the expansion of the quarry in that direction. This end of the quarry can now be opened up, making more stone available within a short haul.

The quarry, which has been described in detail in a number of past articles, is worked on three levels and is now about 100 ft. deep. Three electric shovels formerly loaded trains on whichever of the levels were in use. Several miles of track and 52 tipple dump cars of 10 cu.yd. capacity were used. Two 15-ton and one 30-ton gas-electric locomotives hauled the loaded cars to the two inclines to the crusher building. Hoists operated by 400-hp. electric motors hauled the cars one at a time from the different levels to the crusher building where the rock was discharged into the 42-in. Allis-Chalmers gyratory primary crusher. With both hoists sometimes operating simultaneously a peak load of 600 hp. was developed by the hoist motors alone.

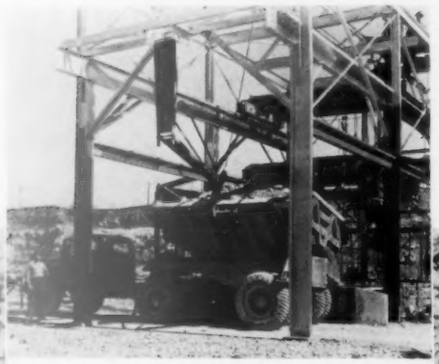
The new crusher building and the conveyor gallery are built entirely of steel with concrete footings and foundations. The crusher opening is on the second level which consists of stone suitable for both cement and commercial aggregates. The top level is cement rock and at the time of the writer's visit a Bucyrus-Erie 100-B electric

Another view showing load of stone being dumped to the primary crusher.

The 2½-cu.yd. electric shovel loading stone into one of the truck-trailers.

Quarry operators everywhere are studying these *Bigger Payloads*

THE DEWEY PORTLAND CEMENT COMPANY, DAVENPORT, IOWA, JOINS THE SWING TO BIGGER PAYLOADS; INSTALLS 3 EASTON-PHOENIX TRAILERS



Dumping by a fixed hoist at the crusher. Either fixed hoist or built-in hydraulic hoist can be supplied by Easton

One of three Easton-Phoenix Semi-Trailers now operating at the Dewey Portland Cement Company's Davenport Plant

At Davenport, Iowa, you can see three of these big EASTON-PHOENIX Semi-Trailers snaking along on a half-mile round-trip haul . . . dumping into the crusher one in every three and one-half minutes . . . totalling an average of 315 tons an hour!

Any quarry could be justifiably proud of such performance! The Dewey Portland Cement Company, setting these records at their Davenport plant, say in their own words: "We feel that we now have a quarry operation equal to any in the country." This fine performance will mean continuous savings and continuous profits at the Dewey plant for many years to come, because Phoenix bodies are built to take it—and dish it out in Bigger Payloads.

Long ago Phoenix patented bodies earned recognition as the finest unit ever built for handling shovel-loaded rock. Phoenix Cars for rail haulage and Phoenix Truck Bodies are well-known. Now the same patented Phoenix, with developments grounded in years of practical experience, is swinging progressive operators to the faster, more flexible Easton Semi-Trailer haulage system.

Faster between quarry face and crusher, higher in gross tonnage, lower in operating and maintenance costs . . . all adds up to Bigger Payloads.

Easton-Phoenix Semi-Trailers are available in all capacities. Rear-dumping containers and other designs are available to meet specific conditions. Send in your request now for complete cost and service data.

EASTON CAR & CONSTRUCTION COMPANY, EASTON, PA.

ALL TYPES OF CARS, TRUCK BODIES, AND TRAILERS FOR ROCK HANDLING

shovel with a 3-cu.yd. dipper was being used to cast stone down to the second level for loading along with stone from that level. A Marion 4101 electric shovel with a 2½-cu.yd. dipper was being used to load the trailers. A Bucyrus-Erie 50-B electric shovel with a 2-cu.yd. dipper, formerly also used for loading, is now kept in reserve. All of these shovels are equipped with Ward-Leonard controls. Drilling on both levels is done with well drills and secondary drilling is done with jackhammers. The third level is cement rock and is not being worked at this time.

A Caterpillar 50 Diesel tractor with a La Plante Choate bulldozer is used to keep the quarry clean and to keep up the roadways for the trucks. After a blast this machine is used to clear a path for the shovel and the trucks so that loading can begin with a minimum of delay.

The quarry fleet consists of three tractor-trailer units. One tractor truck is an International DR-70 and the other two are General Motors AC 802 units. The semi-trailers are Easton Phoenix TR-10 side-dump units designed to haul 17 tons. Actually the loads at this quarry average over 20 tons. The trailers are mounted on four Goodyear 14-ply Road-Lug tires on dual wheels. They were equipped with Westinghouse air brakes as they may later be used to haul stone down from the upper-level to the crusher. The tractor

Load of stone being discharged into crusher.

trucks are also equipped with 14-ply tires on their front wheels and dual rear wheels. The International truck is equipped with Goodrich tires and the General Motors trucks with Goodyears.

The patented Easton Phoenix semi-trailer bodies are similar in design to previous models made by the company for car and truck mounting, having all-steel bodies and all the other usual features. In addition their frames are equipped with outrigger feet on each side to hold the frame rigid while the load is being dumped. These feet are steel extensions of the frame at front and rear on both sides. The truck-trailers are driven up to the crusher in such a way that these feet rest upon a concrete wall with a steel plate top as the bodies are dumped, taking the heavy shock load that would usually be absorbed by the tires on the dumping side. These feet can be raised or lowered to the desired height by means of shims and the ends of the wall are sloped slightly to compensate for any slight variation in loading. Two painted marks on the wall enable the operator to spot his load perfectly for dumping by lining up the front foot on the nearest mark. This system has worked out very well and the truck drivers have become so expert that they spot their loads perfectly every trip without loss of time. The reason for having out-riggers on both sides is that the shifting of operations from one part of the quarry to the other may make it advisable for the trucks to enter the

The 1-cu.yd. clam-shell crane loading clay into one of the end-dump trucks.

crusher building from either side. An Easton patented elbow-type hook is used for dumping the bodies. This is operated by an electric hoist driven by a 20-hp. motor.

These truck-trailers and the other equipment installed have increased the capacity of the quarry considerably. One shovel, working steadily, now does all the loading formerly done by the three shovels each working intermittently on three different levels. The trucks are now making a round trip of about ¼ mi. With a truck making a round trip in about 3 min. they are feeding stone to the plant at the rate of about 340 tons per hour. Actually the trucks are kept waiting with such a short haul and two would be ample at this time. The third truck will be needed soon when a more distant part of the face is worked.

The primary crusher is driven by a 200-hp. motor through Texrope V-belts. An overhead crane is used to operate a stone hook for dislodging large stones. The inclined belt conveyor to the secondary crushing building at plant level is 30-in. wide and operates on 450-ft. centers with a 15 deg. 31 min. incline. Goodrich belting and Webster Timken-bearing idlers are used. The conveyor is fully inclosed for its entire length and is driven by a 75-hp. slip-ring motor.

Stone from this conveyor can be

The Diesel tractor and bulldozer which maintain the roads and quarry floor.

discharged to either of two flows for cement rock or commercial stone. Output is now about evenly divided between these two materials as the company's sales of commercial crushed stone have grown rapidly in recent years.

The commercial stone is fed to a 10-in. Newhouse crusher from which it is conveyed to the screening building. A 4-ft. by 14-ft. Tyler Tyrock 3-deck screen has just been installed to supplement existing screens. The cement rock is fed to a Gruendler hammer-mill and to a series of screens which also produce small sizes of crushed stone.

Supervision of the entire change of the installation was under Fred B. Hunt, Plant Manager, construction and erection under G. S. Parker, Plant Superintendent, and the engineering and designing was done by E. B. Smith, Chief Engineer.

Few Corundum Deposits Developed in U. S. A.

Corundum was first recognized in the United States a little over a century ago from a specimen submitted for identification from the Laurens district in South Carolina. Systematic mining for corundum, as distinguished from emery and the gem varieties, was first started at Corundum Hill, N. C.

The mineral has been found in many localities throughout the Appalachian belt from Massachusetts to Alabama, but only a few deposits have been developed. The best deposits are found in Jackson, Macon, and Clay Counties, North Carolina; and Rabun County, Georgia. Between 1900 and 1905 the corundum deposits of Gallatin County, Montana, were also worked.

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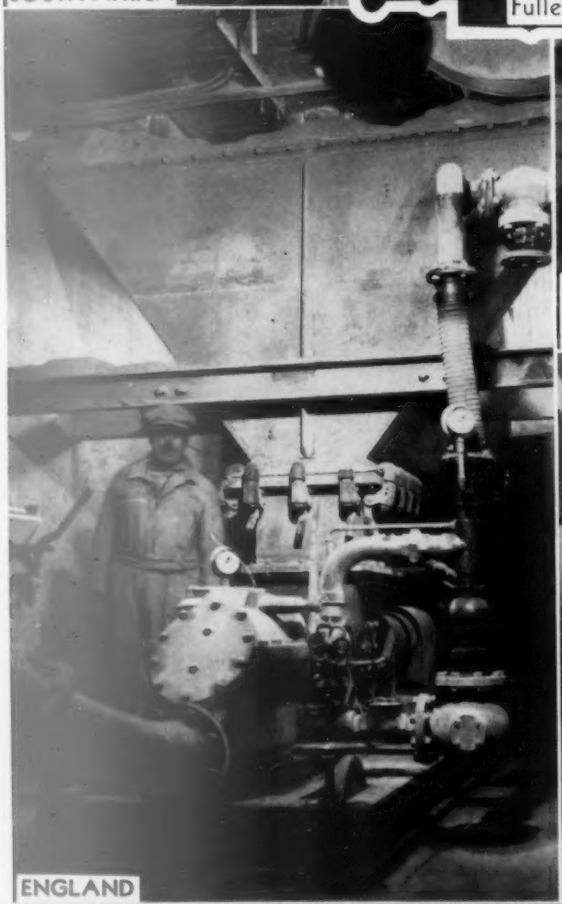
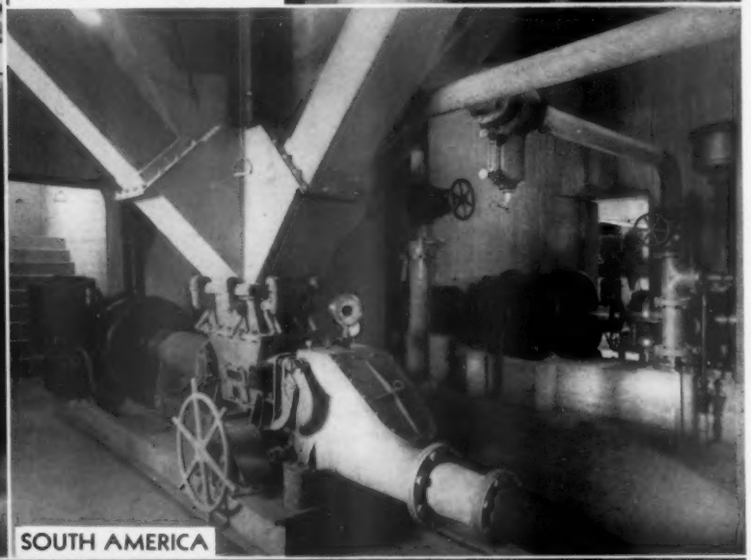
SOUTH AFRICA

Fuller-Kinyon Type H Pump

CALIFORNIA (U.S.A.)
LOADING A BULK CEMENT CARRIER ON THE PACIFIC.



ENGLAND



SOUTH AMERICA

FULLER COMPANY - CATASAUQUA, PA.

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SLURRY AGITATION

By A. W. CATLIN and R. R. MILLS
Engineers, Manitowoc Engineering Wks.

ONE of the advantages of the wet process for manufacturing Portland cement is the better control obtainable for the kiln feed. In order to obtain this control the arrangements for slurry agitation should be carefully planned.

In laying out the slurry-blending, storage and kiln-feed tanks consideration should be given to possible variations in the analysis of the raw material. The variation in lime content in the various blending tanks may be as much as 15 per cent. Under more favorable conditions the lime content of the raw material may run fairly uniform, and good control can be obtained by proper proportioning of the feed to the raw-grinding mills. For example, where the raw materials are limestone and clay, clay is pugged in a wash-mill using approximately 60 per cent. water and is fed by a pipe-line to the grinding mill. The limestone feed rate is determined by the capacity of the grinding mill at the desired fineness, and the feed of the clay slurry is varied by different size nipples to obtain more proper proportioning of the mix. These considerations determine the arrangement of the slurry tanks themselves.

The design of the slurry agitator is of particular interest to the operator turning out uniform high-quality cement at minimum cost. Mechanical agitators have been used, but operators know that their first cost and the cost of their operation is high compared to those of more modern equipment. Pneumatic agitators, using compressed air alone, with various arrangements have been used. The Pachuca tank, operating on the air-lift principle, or the Parral tank, having a flat bottom with a number of air-lift columns, or a tank fitted with stationary vertical air pipes, all operate with compressed air only.

Vertical air pipes require a large amount of air. In addition frequent expensive cleaning of the tank is required to maintain the entire volume of the tank available for storage, since the unagitated portions of the tank build up gradually with a material very difficult to remove.

Slurry agitators serve two purposes, agitating and blending. The term "agitating" is used to describe the action of maintaining, in a storage tank for example, uniformity throughout the entire volume of the tank as regards size of particles and chemical composition. "Blending" covers the case where slurries varying in chemical composition enter a blending tank and must result in the mix desired uniformly throughout the tank. The term "blending" is used to distinguish between agitating only and combined mixing and agitating. Present grinding practice requires that the raw materials be ground finely and uniformly and that the resultant slurry lend itself readily to agitation.

Most recent installations of agitators have used what may be termed combined mechanical-and-air agitation. They consist in the main of a rotating arm with air pipes distributed radially so as to discharge over the entire area of the bottom of the tank. The rotating arm of such equipment keeps the tank clear for its entire volume and also directs the air used for agitation.

The compressed air used in such equipment gives the slurry in the tank what can be called a boiling action. The air bubbles released at the bottom and escaping to the top lighten the slurry column and cause it to rise. Also the air bubbles cause the slurry to rise by what may be termed mechanical action, just as a paddle would act. In other words, the agitation accomplished by the air is to a large extent the same as that accomplished by mechanical agitation but in a much more efficient manner.

For blending slurries, with the proper design of equipment, slurries varying as much as 15 per cent. in lime content can be uniformly mixed throughout the volume of a tank 38 ft. in diameter and 25 ft. deep in 2 hr. using, under these conditions, compressed air continuously.

Maintaining agitation in a storage tank, with present grinding practice, requires the use of compressed air at about half-hour intervals.

In both these cases, agitating and blending, the result to be obtained should be that the lime content of the entire volume of the tank should be uniform within 0.1 per cent. This for all practical purposes gives a perfectly uniform slurry, as the method by which routine chemical analyses for lime are made may be in error by this amount, namely 0.1 per cent.

The aim in the designing of proper agitating equipment should be, therefore, to use air as economically as possible with entire freedom from operating difficulties. These operating difficulties consist of keeping the air pipes from plugging and avoiding trouble with any bearing which may be buried in the slurry.

In order to prevent the pipes from plugging an efficient method is to use a straight pipe without any restrictions at the outlet end, while, at the same time, air from the main air line or compressor should be directed to only one outlet at a time to the bottom of the tank. It will be apparent that when air is directed to one pipe only any tendency of this pipe to plug immediately allows the air pressure to build up to the compressor pressure. In addition, when the air is turned off from this pipe, an air column remains in the pipe, preventing the slurry from entering. This principle assures elimination of the difficulty of plugged pipes and is very readily accomplished.

The step bearing has in the past given some trouble but by using a design based on the principle of the diver's bell, in which entrapped air in the bearing prevents the slurry from entering the journal, the problem of maintaining the step bearing commonly used in this type of agitator has been overcome.

The total cost of slurry agitation depends, of course, upon the requirements as to blending and storage capacity. However, a plant having an annual capacity of 1,250,000 bbl. can be operated at a power cost, for driving the agitators and compressing the air, of 2 mills per bbl., when the proper mix can be closely approximated at the grinding mills and the total slurry storage is sufficient for three to four days' output.

Since compressed air costs a total of about 1c. per 100 cu. ft. to compress to 100 lb. p.s.i. gage pressure—including interest, depreciation, operating and power—it is very desirable to use the minimum amount of air. If the agitator used requires air intermittently, namely at half-hour intervals, and feeds air to one pipe at a time, the average air requirement for each agitator can be estimated at 25 cu. ft. of free air per min. However, it will be found that, during the time the air is blowing from the one pipe, 175 cu. ft. of free air per min. will be released. Since a number of agitators can be synchronized to blow alternately, advantage should be taken of this fact in order to maintain a low compressor load. If, for example, air blows in one agitator 5 min. and is shut off for 30 min., as many as seven tanks can be used and still maintain the maximum compressor load of 175 cu. ft. of free air per min. This can be accomplished while obtaining perfect agitation.

In dealing with cement slurries it is

WEIGHTOMETER • FEEDOWEIGHT

Weighs Moving Material *Controls Feed by Weight*

The Merrick Weightometer provides a continuous, automatic, accurate weight record while material is in motion on conveyor. In world-wide use—insures the most profitable handling of bulk products.

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The Merrick Feedoweight automatically feeds, weighs, totals and registers the amount of material fed. Power operated feed control-gate maintains scale beam in equilibrium, assuring accurate operation.

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TURNING **DUST** INTO DOLLARS

SLY DUST FILTER ADDS TO INCOME OF CRUSHED STONE COMPANY

A large crushed stone company in the East had a serious dust problem.

They crushed about 200 tons of stone per hour (1400-1800 tons per day). Their problem was not only to eliminate the dust nuisance but also to clean the rock to meet buyers' specifications.

They installed a Sly Dust Filter of 30,000 cu. ft. of air per minute capacity. It collected from 8 to 10 tons of dust per 1000 tons of stone—or *approximately 1% of the tonnage of rock handled.*

This dust was put up in bags and sold at a very satisfactory price.

Thus, the company eliminated the dust nuisance, improved their product, satisfied their customers and added materially to income by the installation of the Sly Filter.

Daily, we help solve problems of this kind. If you, too, have one we'll be glad to advise on it, without obligation. The accumulated experience of 65 years is at your disposal when you have a Sly man on your particular problem.

THE W. W. SLY MANUFACTURING CO.

4745 Train Avenue Branch Offices in Principal Cities Cleveland, Ohio

desirable to establish certain of their physical characteristics in addition to their chemical analyses. It is a simple matter to ascertain the weight per cubic foot and the moisture content of a slurry. Given these data as a basis, other values may be determined by means of formulas in which we employ the following nomenclature:

Let:

S = Percentage of solids by weight, expressed as a decimal,
S_1 = Percentage of solids by volume, expressed as a decimal,
L = Percentage of liquid by weight, expressed as a decimal,
L_1 = Percentage of liquid by volume, expressed as a decimal,
G = Specific gravity of solids,
G_1 = Specific gravity of slurry,
V = Cu. ft. of slurry per ton,
V_1 = Cu. ft. of slurry per ton of solids, and
W = Weight of slurry in lb. per cu. ft.

When the specific gravity of the liquid is unity, as water, then—

(1) $S = 1 - L$

(2) $S_1 = \dfrac{S}{S + GL}$

(3) $L_1 = \dfrac{L}{\frac{S}{G} + L} = 1 - S_1$

(4) $G = \dfrac{SW}{62.5 - WL}$

(5) $G_1 = \dfrac{W}{62.5}$

(6) $V = \dfrac{32}{G_1} = \dfrac{2000}{W}$

(7) $V_1 = \dfrac{32}{GS_1} = \dfrac{V}{S}$

It may be pointed out in this connection that these formulas have been amplified perhaps to a greater extent than is generally necessary for dealing with cement slurries in order that they may be applied to slime pulps, such as cyanide slimes, in metallurgical practice where tonnages and volumes are important. The weight of a cubic foot of water is taken at 62.5 lb. under all conditions to simplify the equations, this figure being considered sufficiently accurate for all practical purposes.

Where compressed air is employed, either in whole or in part, to provide agitation, it is desirable to know the pressure required to force the air through the slurry load in a given agitation tank. The theoretical pressure may be calculated from the fundamental formula in hydrostatics,

$$p = 0.433h$$

by introducing the factor G_1 (specific gravity of the slurry). Therefore, the formula becomes

$$p = 0.433\,G_1h,$$

in which p = air pressure in lb. per sq. in. and h = the static head or depth of slurry above the air-admission point. This theoretical pressure should be increased, as conditions may necessitate, to provide for pressure drop through friction in air-lines, valves and fittings.

As an example of the application of the foregoing formulas, the following results have been calculated from actual conditions, where a certain slurry was found to contain 32 per cent. of moisture by weight (L) and weighed 106 lb. per cu. ft. (W). The calculations themselves, which are extremely simple, are omitted.

Percentage of solids by weight	(S)	68.0
Percentage of solids by volume	(S_1)	45.75
Percentage of liquid by volume	(L_1)	54.25
Specific gravity of solids	(G)	2.52
Specific gravity of slurry	(G_1)	1.70
Cu. ft. of slurry per ton	(V)	18.87
Cu. ft. of slurry per ton of solids	(V_1)	27.75

Granules Ground from Wide Variety of Stone

Granules, or roofing granules as perhaps they are more commonly known, include crushed slate, "greenstone," quartzite, slag, brick, and other rocks or ceramic products used either in their natural state or artificially colored. Crushed slate has ben widely used by roofing manufacturers, and all granules are commonly called "slate" irrespective of their composition.

Roll roofing antedates asphalt shingles, although both are made of a layer of roofing felt impregnated with an asphaltic compound. The original purpose of surfacing materials on roll roofing was to prevent sticking in the roll, and large quantities of talc and mica are still used for this purpose on both roll roofing and shingles. The fire-resisting properties of a thicker surface coating were recognized during the early years of roofing manufacture, as was also the protection afforded the asphalt from the actinic rays of the sun. Granules, or rather the forerunner of present-day granules, primarily served a utilitarian purpose. The development of granules for color and decorative effects parallels the growth of asphalt shingles.

Fundamentally, the manufacture of roofing granules is closely allied with production of crushed stone and might well be included with that industry if it were not for the wide variety of materials employed. Slate, greenstone, and other rock granules, whether marketed in a natural state or treated, are merely carefully graded products of crushed-stone operations. "Silicate" or "ceramic" granules for the most part are also crushed-stone products subjected to further processing. On the other hand, no close relationship exists between slag or glass granules and the crushed-stone industry.

In a typical granules plant primary reduction is by jaw or gyratory crushers, after which the material passes through rolls and thence to screens. The average product is the fraction that passes 8 mesh, or possibly 10 mesh, and is retained on 35 mesh. In some slate-granules plants, fines are pulverized and sold as slate flour, and various sands for industrial or abrasive uses may be produced at plants grinding quartzite or quartz gravel for granules. For the most part, however, fines have little value and accumulate in huge waste piles. Care is taken to keep the finisher granules free from dust. Elaborate dust-collecting systems in many plants serve the twofold purpose of protecting health and ensuring a clean product. In some instances natural rock granules are oiled before shipment. This procedure not only eliminates dust but also temporarily brightens the colors.

Grinding Pebbles Made by Sioux City Company

Extremely hard pebbles of flint or quartzite were used at one time to a large extent in cylindrical or conical mills for the grinding of cement, ores, paint, soft minerals, clays, etc. Steel balls and steel or rubber liners have to a large extent replaced the natural products, except where there may be danger of iron contamination from metal worn off the balls or liners. On this account the pottery industry is now probably the largest consumer of natural pebbles and liners.

In the United States the largest producer of both pebbles and liners is the Jasper Stone Co., Sioux City, Ia. Small cubes or blocks are cut from the quartzite at Jasper, Minn., and artificially rounded by tumbling in rotating cylinders. Liners are cut from the same rock. These pebbles and liners are used for grinding cement, ores, silica, paint, gypsum, feldspar and in the ceramic industry. A few car lots of beach pebbles are shipped annually from Encinitas Beach, near San Diego, Cal. These pebbles of granite, porphyry and quartzite are continually being carried ashore by means of floating kelp plants, to which they are attached. The production in the United States during the past 15 years has ranged between 2000 and 6300 tons, except for the low year of 1932, when only 976 tons was sold. The average value is about $13 per ton.

EVOLUTION of Kiln Ends

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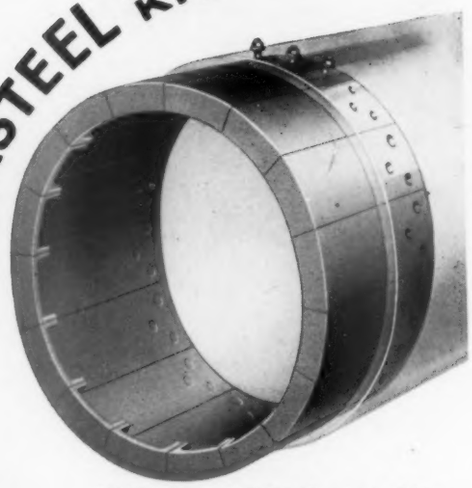
PYRASTEEL 16-Segment KILN END



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The Portland cement plant of the Louisville Cement Co. at Speed, Ind. At right is the raw-material storage building.

Complete Dust-Collecting System Latest Improvement at Speed

THE Louisville Cement Co. can point with pride to both its modern Portland and masonry-cement plants at Speed, Ind., and to its ancestry which dates back to the year 1866. The original producer of cement in this area was John Hulme, who started producing natural cement in 1830 for use in the construction of the Louisville and Portland Canal. This plant was later operated by a succession of individual owners and partnerships, the last of whom was the firm of Rhorer & Speed.

In 1866 the Louisville Cement Co. was formed and took over the operations, which were then located at Shippingport, Ky., below the falls of the Ohio. Both natural cement and flour were produced alternately in this mill at that time. In 1868 the company bought part of its present property at Speed, Ind., and built a plant there for the production of natural cement. A third plant at Watson, Ind., was also purchased, the combined capacity of all three plants being about 1,000 bbl. daily.

The capacities of these plants were increased until their combined capacity was 7,500 bbl. daily. In 1899 the peak was reached, when a total of 953,000 bbl. was produced. At that time, with 19 cement mills, the Speed area was the largest cement-producing section of this country.

About 1900 the demand for natural cement began to fall off rapidly due to the growing popularity of Portland cement. Realizing this trend, the company in 1904 began the construction of a Portland-cement plant at Speed. This plant went into operation in 1906 with a capacity of 700 bbl. per day. The Shippingport and Watson plants were abandoned in 1907, concentrating all natural and Portland cement production at Speed. The natural-cement plant was converted in 1916 to the manufacture of masonry cement under the trade name of Brixment. Following a fire in 1922 this plant was entirely rebuilt. The present plant has a capacity of 3,500 bbls. of Brixment per day. Natural cement is also produced in the present plant. In 1925 the rotary-kiln Brixment plant at Akron, N. Y., was built. This has a capacity of 2,500 bbls. daily. In 1885 the company erected a lime plant at Milltown, Ind., and this has been rebuilt and improved through the years.

The Portland-cement plant has been steadily enlarged and improved. Before 1910 the two original 7-ft. by 100-ft. kilns were supplemented by two 8-ft. by 125-ft. and two 10-ft. by 150-ft. kilns. In 1923 the two 8-ft. by 125-ft. kilns were lengthened to 160 ft. with 10-ft. diameter burning zones. In 1914 one of the first installations of Babcock and Wilcox waste-heat boilers in the cement industry was made in this plant, replacing coal-fired boilers. In 1922 the power generating equipment was augmented by the installation of a 1,000-kw. Allis-Chalmers Turbo-generator, in 1924 a large cross compound Corliss engine driving the Raw Department was replaced by a 2,500-kw. General Electric unit and in 1936-37 a 3,000-kw. Westinghouse unit replaced a similar engine and two low pressure turbo-generators.

In 1923 and 1924 new reinforced-concrete storage silos were built and in 1926 the crushing and drying departments were rebuilt with all new equipment. Two Weber concrete kiln stacks were erected, one in 1926 and one in 1928.

In recent years many other changes affecting the efficiency of this plant and the quality of its product have been made. In 1936 the clinker storage was provided with a roof, Richardson scales were installed to proportion the feed to the raw and finish-grinding mills and

Between the pack-house and silo is the conical cooler used for cooling hot cement before loading in bulk.

Raymond separators and Norblo dust-collectors were installed in the raw-grinding department. In 1937 Raymond direct-firing coal pulverizers were installed on the four largest kilns. A fifth mill was installed for the driers and the two 100-ft. kilns. Vanderwerp recuperators were added to the 150-ft. kilns. Early in 1938 the old quarry equipment was replaced by a Bucyrus-Erie 120-B electric shovel and 35 Easton steel dump cars. Redler conveyors

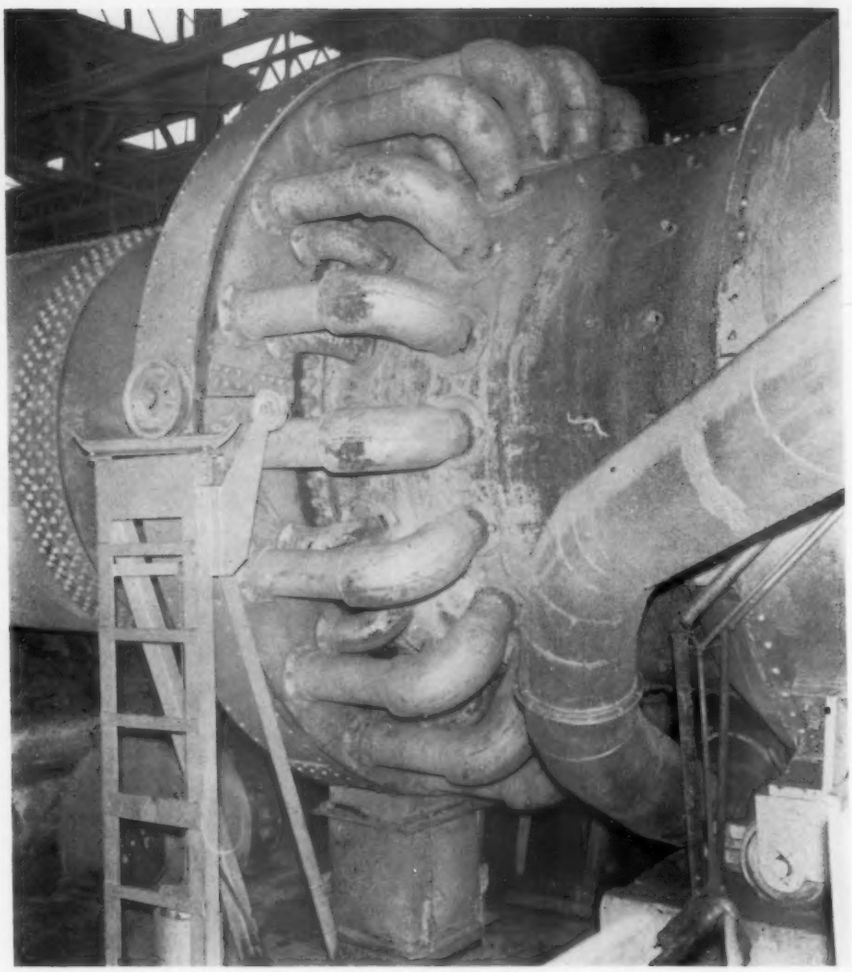
The 4¾-cu.yd. electric shovel loading a train of cars in the quarry.

were installed to feed the kilns and speed-reducer drives were provided for the two 150-ft. kilns. Late in 1938 a Smidth finished-cement cooler was added. The installation of Norblo H.E.L.S. flue dust-collectors has just been completed.

The plant now has a daily capacity of 5,000 bbl. of standard Portland cement. High-early-strength cement and modified type B cement are also produced.

Both plants at Speed are being supplied from the same quarry about one mile northeast of the plant. A 12-ft. ledge of natural cement rock is used for the Brixment plant. Under this is a 40-ft. ledge of rock used for Portland cement. Separate shovels and cars are used for these two materials.

A closeup of one of the 11-cu.yd. drop-door quarry cars being loaded.

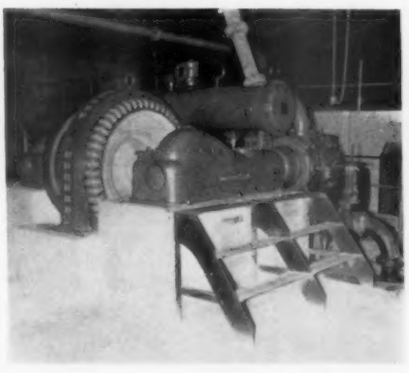


One of the 8-ft. recuperators used on the two 150-ft. kilns in this plant.

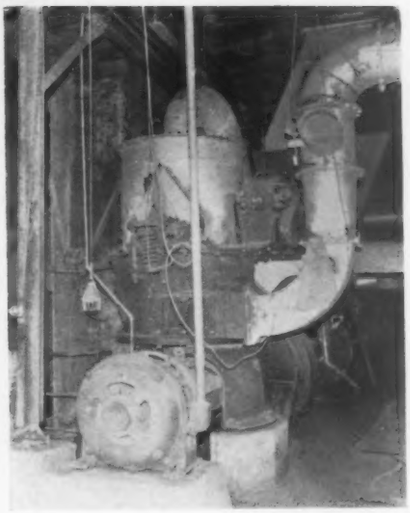
The Portland-cement rock deposit is being worked in two benches, operations now being on the upper ledge. Ingersoll-Rand X71 wagon drills are used. Stone is loaded by the Bucyrus-Erie 120-B electric shovel which has Ward-Leonard control and a 4¾-cu.yd. dipper. While waiting between trains this shovel places behind it the rock which is too large to be handled. This rock is then further reduced by secondary shooting without interfering with loading operations, and the shovel loads it on a return trip along the face.

The 35 new Easton 11-cu.yd. Won-Way steel quarry cars are equipped with Timken roller bearings and operate on 1-meter gage track. They are usually loaded in trains of eight cars each which are hauled to the plant by steam locomotives. At the plant an Easton fully-automatic dumping mechanism with a Curtis airhoist is used to empty the stone from the cars into the primary crusher. This mechanism is floor mounted and a special head on the hoist piston engages a dumping bracket on the bottom of one side of the cars and locks to it until the car body is returned to its original position. The operator's station is on the crusher side of the cars and an arrangement of mirrors makes it possible for him to see if the dumping mechanism is functioning properly.

The 24 K Allis-Chalmers 48-in. gyratory crusher discharges its minus eight inch product on an inclined bucket-elevator which feeds a Pennsylvania SXT12 hammer-mill. The minus 1¾-in. secondary crusher product is elevated to a shuttle conveyor which distributes it to storage.



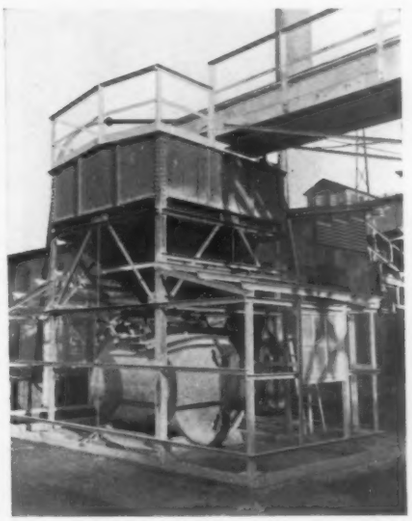
The new air compressor recently installed in this plant.



One of the four direct-firing coal mills on the four large kilns.

Shale, which is the other raw material used, is obtained from a quarry 3 miles west of the plant. A steam shovel loads the cars, which are hauled to the plant by steam locomotives. The shale is reduced by two dry pans, from which it is elevated to one of the three Allis-Chalmers rotary driers.

The storage building has a capacity of 5,000 tons of rock and 1,500 tons of shale. An overhead crane is used to



The air-activated conveying system which returns flue dust to the kiln-feed hoppers.

distribute and reclaim the shale and rock. The shale is fed to the driers but the rock can by-pass the driers in dry weather and be discharged direct to bins in the raw department. A tunnel conveyor under the storage can also be used to feed stone to either the driers or the bins.

Two Richardson automatic scales under the bins proportion the stone and shale to elevators which discharge them to the preliminary raw-grinding mill-feed bins.

Three F. L. Smidth Kominuters, two No. 66 and one No. 85, and a Sturtevant Mill Co. Duplex ring-roll mill are used. The Kominuters have internal screens. The ring-roll mill is in closed circuit with an external rotary screen. The product of these mills is carried by screw conveyors and elevators to bins feeding the four F. L. Smidth secondary tube-mills.

Three No. 16 mills and a No. 18 mill are used. The product of these mills can be carried by screw-conveyors and bucket-elevators to two Raymond 16-ft. mechanical-air-separators. These are arranged so that any desired combination of mills and separators can be used. The separator rejects are returned by gravity to the mills. The separator fines (finished raw material) are carried by screw-conveyors and elevators to the kiln-feed hoppers. The entire raw-grinding department is connected to a Norblo dust-collecting system.

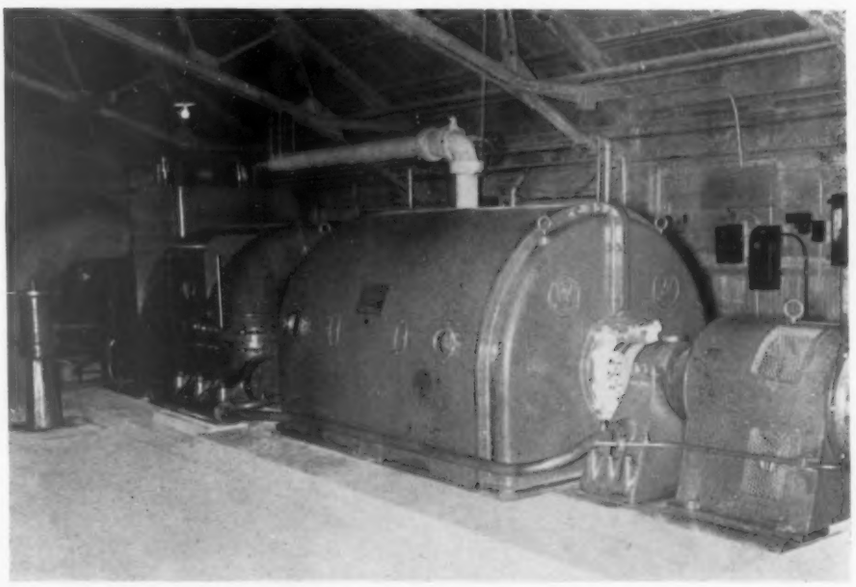
Stone being dumped from car into primary crusher.

Each of the four large kilns is fed by one of a pair of 9-in. Redler conveyors and one of the 100-ft. kilns is fed by 7-in. Redlers. The Redlers elevate the material on a 70-deg. incline to approximately the hydrostatic level of the material in the kiln feed bins from which point it is discharged by gravity into the kiln. This arrangement has stopped any tendency of the material to flood or run. These feeders were originally operated independent of the kiln speeds and the rate of feed was varied by means of variable-speed motors. Recently two kilns were equipped with new drives which synchronize the kiln and feeder speeds. Each kiln is driven by a 50-hp. Allis-Chalmers vari-

The automatic scales which proportion stone and shale in raw-grinding department.

able-speed motor through a Jones gear reducer. A Westinghouse Synchro-tie generator is driven from the motor shaft of the reducer and this supplies current for, and regulates the speed of, the motor driving the feeders for this kiln. The other 100-ft. kiln has a screw feeder.

The coal used for all the firing is dumped from cars into a track hopper and is carried by an elevator and a Jef-



The new 3,000-kw. turbine generator which replaced several smaller units.

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(1) Change dry-process plants to the wet-process, *without any change in his kilns*—or

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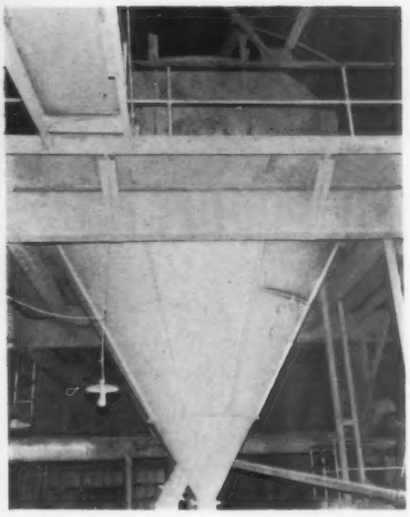

One of the two 16-ft. separators in the raw-grinding department.

The 14-ft. cyclone collector which collects drier dust for return to raw-mill stream.

frey drag-chain conveyor to the five coal-mill-feed bins. Each of the four 150-ft. and 160-ft. kilns is fired by an individual No. 402 Raymond bowl mill. A fifth No. 402 mill delivers pulverized coal through a cyclone into a bin from which a 6-in. Fuller-Kinyon pump can deliver it to bins feeding the two 100-ft. kilns and the three 8-ft. by 80-ft. rotary driers. Fuller-Lehigh feeders are used on the driers and Bailey feeders on the short kilns.

The two 150-ft. kilns are equipped with Type CI Vanderwerp 8-ft. recuperators. Formerly a high-grade, 13,400 B.t.u. coal was used, but since the recuperators and bowl mills were installed a 10,000 to 11,000-B.t.u. coal has been used at a considerable saving.

The exit gases from these kilns, averaging from 1,400 to 1,600 deg. F. in temperature, generate power for all the operations of both plants and for the company-owned village of 150 houses. The two 10-ft. by 150-ft. kilns are connected by a common flue to a Babcock & Wilcox 1,500-hp. waste-heat boiler. A fan draws the gases through a Sturtevant economizer and discharges them into a pair of new 15-ft. 4-in. diameter Norblo H.E.L.S. cyclone-type dust collectors. These are connected to a 12-ft. diameter by 300-ft. Weber concrete stack. A Robinson air-activated conveying system has just been installed to return the dust to the kiln-feed hoppers. This system is manually controlled and is used only once each shift, handling about 2½ tons of dust per cycle. The collected dust accumulates in a hopper over the conveyor tank during the intervening period.

The other four kilns are connected by a common flue to a second 1,500-hp. B & W waste-heat boiler. The gases are drawn from the boiler by a fan through three Norblo 14-ft. diameter type H.E.L.S. collectors in parallel followed by a Sturtevant economizer. This collecting system, now in its second year of operation, is about 75 per cent. efficient. The fan vents to another 12-ft. by 300-ft. Weber stack. The collected dust is returned to the kiln-feed hoppers by a Fuller-Kinyon pumping system.

Another Norblo 14-ft. H.E.L.S. collector has been installed between the drier flue and this stack. Screw-conveyors return the collected dust to the general mill stream in the raw-material grinding department.

The two 15-ft. 4-in. cyclone collectors which collect dust from the two 150-ft. kilns.

Kiln drive mechanism with variable-speed drive of generator driving feeder motor in synchronism.

There are also four stoker-fired B & W boilers, but only one or two of these are ever needed and then only occasionally. Power is normally generated by the 2,500-kw. General Electric and the 3,000-kw. Westinghouse units leaving the 1,000-kw. Allis-Chalmers unit for standby or extra capacity service. The current generated is 480 v., 3 phase, 60 cycle. About 2,300 hp. of the load is accounted for by synchronous motors driving the tube-mills.

Clinker is discharged from the kilns into a pit, from which an overhead crane transfers it to a 160,000-bbl. storage. This was recently covered with a roof with a resulting improvement in the grindability of the clinker. An overhead traveling crane feeds clinker and gypsum into the bins. Two Richardson Conveyoweigh automatic proportioning scales feed these materials on a belt-conveyor to a scalping screen followed by a Sturtevant open-door rotary crusher, which reduces the mixture to minus 1-in. size. Elevators and drag-conveyors supply the bins feeding the six preliminary grinding mills. Five F. L. Smidth Kominuters, one No. 85 and four No. 66, and a Bradley Hercules mill are used. Elevators and screw-conveyors move this material into the eight finish-mill bins. Four No. 16 and four No. 18 Smidth tube-mills are used. All of these mills are water cooled. The entire finish-grinding department is connected to a Sly dust-collecting system.

The finished cement passes through a series of screw conveyors and elevators into the storage silos and the 75,000 bbl. stock-house. The 10 silos have a total capacity of 165,000 bbl.

In this conveying system a cement cooler has been installed to prevent any objections to hot cement by bulk-cement users. The 270-sq.ft. F. L. Smidth cement cooler is said to be the first of this type installed in a cement plant in this country. It consists of a conical steel shell with a pneumatic feeder which discharges the cement with air into the bottom of the cone. Rotating vanes pick up the cement and swirl it up the inside of the cone. Sprays at the top of the cone keep a constant film of cold water running down the outside of the cone. In this installation cement is usually fed to the cooler at a temperature of about 195 deg. F. When cement is fed at the rate of 120 bbl. per hr. it is cooled to a temperature of about 100 deg. F. At the rate of 140 bbl. per hr. it is cooled to about 110 deg. F. The installation is so arranged that cement can be discharged from a

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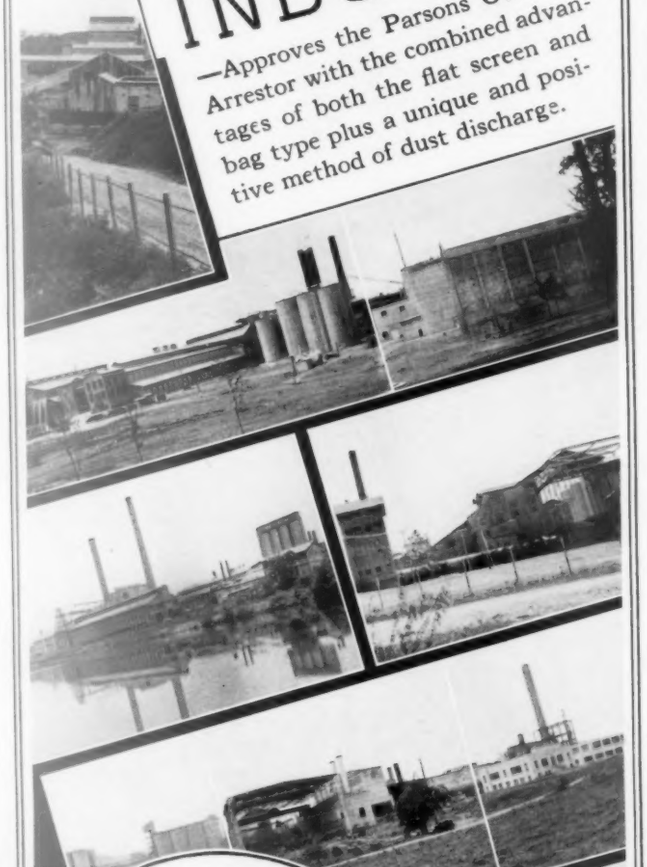

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screw-conveyor into the cooler feeder and the cooled cement is discharged back into the same screw. When cooling is not necessary, the cement passes through this conveyor without being diverted to the cooler.

One of the pack-houses has four 3-tube Bates packers feeding belt-conveyors. Another has three 4-tube low-setting packers. The Speed plants (Portland & Brixment) are served directly by the Pennsylvania Railroad and by the B. & O. Railroad through the Indiana Railroad.

• Recuperator

The underlying principle of the Vanderwerp recuperator, as applied to the rotary kiln, consists in the introduction of the combustion air through the load as it traverses the discharge end of the kiln. The heat exchange which takes place results in a rapid initial cooling of the product, and a high preheat of the combustion air.

The general design and operating features of the recuperator are well understood by cement-plant operators, 42 units having been installed in this country and abroad. However, it may be stated briefly that in the original design the air supply under pressure, is admitted to the interior of the kiln from an annular windbox surrounding the kiln shell, through external air lines entering the shell and spaced symmetrically about its outer circumference. These air lines take the form of manifolds (Type C), single admission elbows (Type I), and double admission elbows (Type CI). In all cases, the air volume is released to the interior of the kiln through heat-resistant alloy liner plates or "grates," directly under the load, these plates replacing the usual refractory lining in this section of the kiln.

Due to the fact that there is considerable variation encountered in kiln design, particularly in the location of supporting tires and rolling mechanisms, and the further fact that kilns are sometimes spaced on rather close center lines, it was found difficult in some cases to install recuperators to advantage, as the air lines interfered with the mechanism and sufficient space was not available to accommodate a windbox of the required diameter.

In order to meet these special conditions, the Type F recuperator was introduced and as an initial installation 6 of these units were furnished the Dixon, Ill., plant of the Medusa Portland Cement Co. The performance of these recuperators is such that the design merits full consideration for any plant and it may be added that the first cost is considerably reduced and installation cost greatly reduced.

Figs. 1 and 2 show in outline the general appearance of the Type F unit and it will be observed that the windbox does not encircle the kiln shell, but is positioned between the end of the shell and the firing hood; or the firing hood usually employed may be dispensed with entirely. This construction permits a considerable reduction in windbox diameter, and the complete absence of external air lines makes the installation quite feasible, regardless of the number of tires and their location.

In this Type F design, all instruments and controls are convenient to the kiln operator, being located at the front of the firing hood. These details are indicated on the front elevation of the hood (Fig. 1) and comprise two upper air valve controls for use in starting the kiln from cold to prevent dusting, upper and lower damper controls for adjusting the air blast to the load, and dial type air gauge indicating windbox static pressure in inches of water.

Extended experience in the operation of recuperators indicates that the preferable arrangement is to employ a relatively short liner plate surface and to obtain proper plate discharge area by spacing the plates closely together around the kiln circle. In the Dixon design, the plate length on the longitudinal axis of the kiln is 42 in. and the circular clearance between plates is reduced to ⅜ in. The supporting subframes carrying the plates are as a consequence closely spaced and the intervening spaces between frames are grouted instead of employing, as heretofore, special brick shapes.

With a liner plate length limited to 42 in., it was not expected to obtain as complete initial cooling of the clinker as occurs on a longer plate surface, and in fact the degree of initial cooling was unimportant, rapid air quenching being the chief desideratum. However, in practice it was found that cooling was exceptionally good due to the fact that the cooling air admitted at the open ends of the subframes is thoroughly distributed over the entire area of the load with an apparent preponderance of air at the inner end of the plate surface where the maximum clinker temperature is encountered.

In the matter of rapid air quenching and efficiency of the heat transfer from clinker to cooling air, the Type F recuperator, like its predecessors, offers the maximum in this direction for the reason that the application of the cooling air is made inside the kiln at a point in close proximity to the burning zone where the temperature differential between the clinker and the air reaches its highest value.

• CO_2 Indicator

The Bacharach Industrial Instrument Co., Pittsburgh, Pa., has just announced a new pocket-size CO_2 indicator, trade-named Fyrite. An entirely new principle makes the Fyrite unique in simplicity of use and fool-proof operation. There are no valves, no clamps, no leveling bottle to manipulate. A complete analysis takes less than 20 seconds.

Pocket-size carbon-dioxide indicator.

Distinctively styled from crystal-clear plastic material, the Fyrite is outstanding for its strikingly modern appearance, easy readability and handling convenience. It fits snugly into the hand and its proportions are balanced so that it is not easily upset when placing it on a table, bench or ledge.

The operation of the Fyrite is extremely simple. A dozen of strokes of the aspirator bulb fills a chamber with the flue gas to be analyzed. The sampling hose is then detached which automatically seals the instrument and makes it ready for the analysis. To mix the gas with the absorption fluid, the instrument is turned upside down, then back again to its normal position. This takes about 10 seconds. The suction created due to the complete absorption of the CO_2, pulls the absorbing fluid up in the graduated tube an amount equal to the CO_2 absorbed. Consequently, its level shows the percentage of CO_2 in the gas. The entire operation, including the pumping of the gas, takes less than a minute.

No setting up is required. The instrument as received is ready for immediate use. The absorbing fluid is good for several hundred readings before it needs replacement.

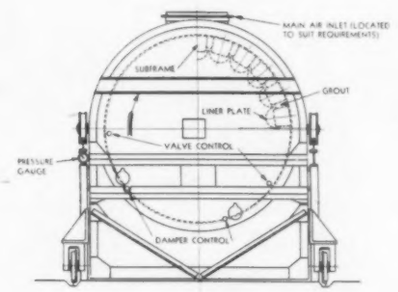


Fig 1

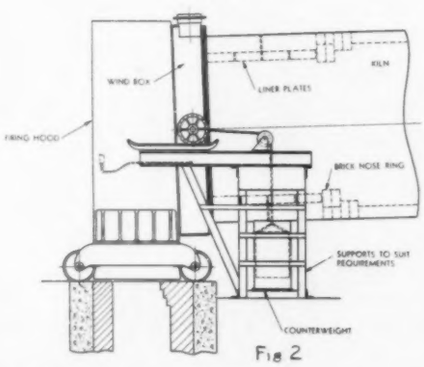


Fig 2

Front elevation (left) and side elevation of recuperator.

TRADE NOTES

Announced at the recent World Automotive Engineering Congress by J. E. DeLong, president of the Waukesha Motor Co., was a new line of engines, known as the Multi-Fuel Poly-Cycle type.

Intended for use with oil, gasoline, butane, or producer or natural gas, every engine in this series is convertible after its manufacture by simply changing the fuel burning accessories.

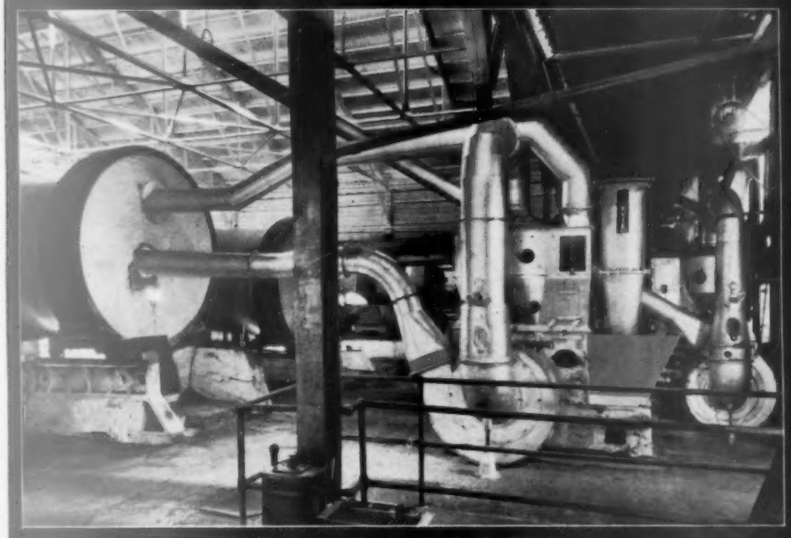
The administrative and sales offices of International Filter Co. were moved June 2 from Chicago's loop district to the company's factory at 325 W. 25th Place. This move was made, according to P. N. Engel, president, to more effectively coordinate work of the administrative, sales, engineering and production departments.

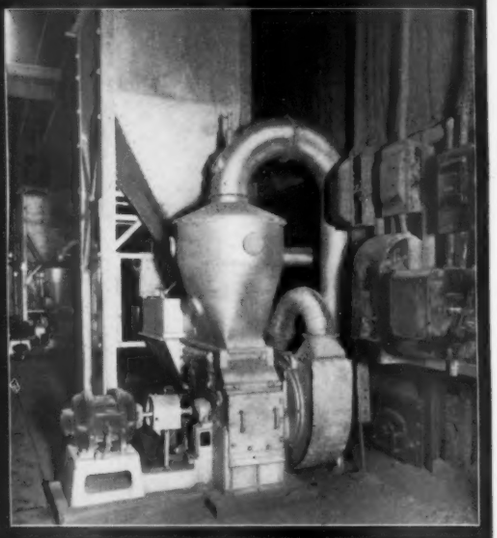
Along with plans to erect new additional buildings and consolidate all manufacturing facilities at Aurora, Ill., the Austin-Western Road Machinery Co. has just announced the following executive changes:

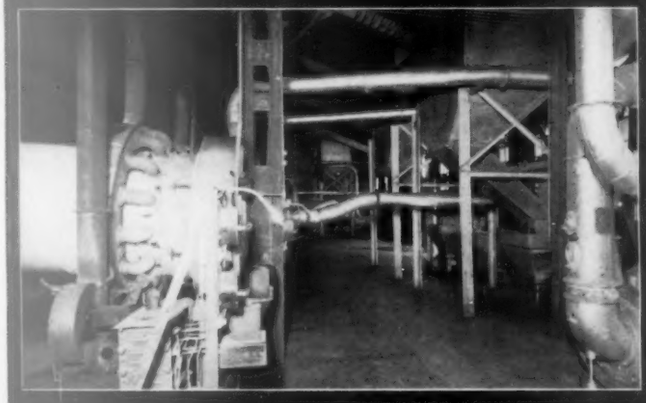
Vice-president F. L. Jerome has been made assistant to the president; Vice-president H. M. Kleiser has been placed in charge of sales, advertising, service, and research; R. K. Stiles has been made sales manager.

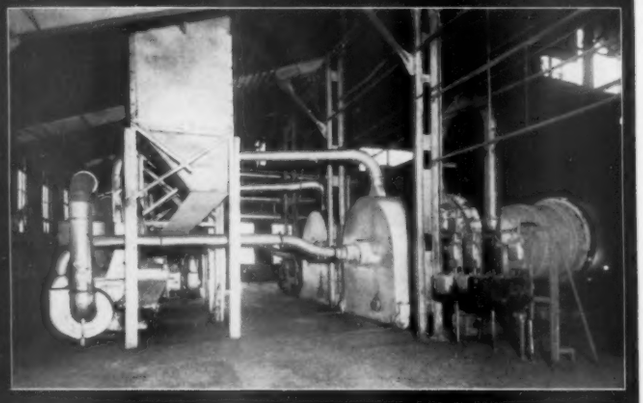
UNIPULVO UNIT PULVERIZERS WILL ANSWER

YOUR BURNING QUESTION









DEPENDABLY because they are designed and built for continuous service, as nearly fool-proof and automatic as possible. Wide-clearance grinding makes them immune to the usual delays and interruptions to which close-clearance pulverizers are usually subject. Rugged construction enables them to stand abuse, even from the hands of inexperienced or unskilled operators. Nearly 500 units in service attest UNIPULVO DEPENDABILITY

S I M P L Y because their construction is such that any owner may provide his own repair parts if he chooses to do so . . . and UNIPULVO users frequently do. A shut-down of an hour or two (depending upon size) is all that is required for making usual replacements, since the machine does NOT need to be dismantled. Air and fuel controls are simple, and no complicated accessories are needed to control flame length and temperature, at all times.

EFFICIENTLY because they will burn ANY bituminous coal, lignite, pitch or petrol-coke, regardless of moisture content or lumps up to 5". Thorough diffusion of fuel in the air stream, plus exclusion of all oversize particles and uniform flame temperature, practically guarantee results in any kiln, dryer, or boiler. Hundreds of satisfied customers will vouch for the economic results obtained by UNIPULVOs since 1924. Full information on request.

Manufactured, Installed and Guaranteed by

THE STRONG-SCOTT MFG. CO.--MINNEAPOLIS, MINN.

N.I.S.A. (from page 32)

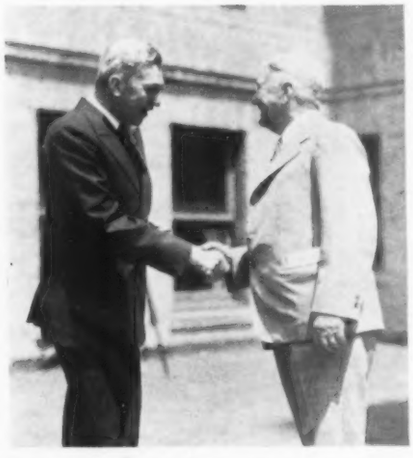
The House Ways and Means Committee approved following changes in the present Social Security Act:

(1) A ceiling of $3,000 on wages subject to the 3 per cent. pay-roll tax for unemployment compensation. Committee Chairman Doughton estimates this will save business about $16,000,000 annually.

(2) Freezing the Old Age Pension Tax at its present level of 1 per cent. for the next three years. The tax, under the present law, is increased to 1½ per cent. next January 1. Doughton estimates this revision in the security-tax structure will save employers and employees approximately $825,000 000 in the next three years.

(3) Inaugurate the Old Age Annuity payments in 1940 (two years ahead of the present schedule).

(4) Revise the Unemployment Compensation law to permit states that have built up adequate reserves to reduce their share of the 3 per cent. tax and



P. S. McDougall (Ottawa Silica Co.), Wilbert Bivins (National Pulverizing Co.).

to allow employers to obtain their full 90 per cent. credit on the Federal pay-roll tax.

A bill (H.R. 5435) has been introduced by Mrs. Norton, chairman of the House Labor Committee, to amend the Federal wage-and-hour law. Mrs. Norton's bill follows recommendations made by Elmer F. Andrews, Administrator of the statute. The bill provides in part: (1) exemption from the hours provision for salaried employees paid $200 or more a month; (2) amends present law to provide that no liability or disability would be imposed upon any person subject to the law for "any act done or omitted in good faith in conformity with any regulation or order of the Administrator," even though such regulation or order should subsequently be amended, rescinded or declared invalid by the courts; (3) permits the Administrator to approve employment in excess of the maximum hours prescribed where employees are paid a regular wage and where overtime hours are compensated for by time-off in subsequent weeks or during vacations with pay; (4) gives the Administrator an authority, not contained in the present statute, to issue general regulations defining application of the law, and to define technical and trade terms; (5) gives the Administrator authority to exempt "hot goods" from the penalty provisions of the act where every person who has a substantial proprietary interest in such goods had no reason to believe at the time of acquiring such interest that the goods were produced in violation of the act; (6) permits the Administrator to bring suit to restrain violation of the Act in any district wherein the defendant is "found, or is inhabited, or transacts business."

Christian Matheisen (Whitehead Bros. Co.), Stanley A. Phillips (Pit and Quarry), Henry C. Thornton (Ottawa Silica Co.).

The Walsh-Healey Act amendments reduce to $2,000 contracts subject to the act and define and bring under the act any subcontractor, meaning "any person who manufactures or furnishes to or for the principal contractor, either directly or through any middleman or broker, all or any part of the supplies required to be manufactured, or furnished by the principal contractor" if the subcontract exceeds $2,000 in amount. The proposed amendments do not contain the so-called Wagner Act amendment sponsored by the CIO.

With respect to the National Labor Relations Act industry generally supports the following amendments: making coercion from any source illegal, permitting employer to file petitions for plant elections; and relieving employer of obligation to deal with unions supporting its demand for collective-bargaining conferences by boycotts or jurisdictional strikes. Industry furthermore supports position that employers complying with the act should be protected against boycotts, picket lines, or other interferences.

Congress is favorably disposed toward amendment of the act, but the following forces are working against modification this session: support of board procedure in specific cases by decisions of Supreme Court; militant defense of board and act by Chairman Madden and Senator Wagner; and the fear of those facing reëlection in 1940 that a vote for modification of act will cause political reprisals.

The labor board might approve four amendments: to permit employers to petition for elections; a more caref l phraseology to express Congressional intent with reference to appropriate bargaining units; limiting powers of the board to invalidate contracts between an employer and a labor organization; and lengthening the period between complaints and hearings.

The O'Mahoney committee is apparently doing a good job and operating on fact-finding basis, according to Mr. Ahern. The committee is sure to recommend a substantial revision of the patent laws to prevent patents from being used for monopolistic purposes. The committee may finally recommend, with Administration support, a modified form of the N.R.A. through the use of governmental licensing; in other words, if industry agrees to accept certain governmental restrictions, it will be freed from threats of prosecution for violating antitrust laws.

The following officers were reëlected for the new year: Russell G. Hay (Ayers Minerals Co., Zanesville, O., president; L. M. Hansen (Industrial Silica Corp., Chicago, Ill.), vice-president; Ralph T. Stevens (Cape May Sand Co., Cape May, N. J.), treasurer. The old board of directors was elected to serve again. It includes: E. J. Beyer (Michigan Silica Co., Rockwood, Mich.), P. S. McDougall (Ottawa Silica Co., Ottawa, Ill.), Mark T. McKee (Sand Products Corp., Detroit, Mich.), A. J. Miller (Whitehead Bros. Co., New York, N. Y.), J. M. Strouss (Decker's Creek Sand Co., Morgantown, W. Va.), W. J. Woods (Pennsylvania Glass Sand Corp., Lewistown, Pa.), A. Warsaw (Wedron Silica Corp., Chicago, Ill.), past president.

Nonmetallic Minerals Used in Chemicals

The geologic origin of the constituents of important industrial chemicals has been traced by a novel method by R. N. Keller and T. T. Quirke of the University of Illinois. The results of their painstaking studies are contained in a paper entitled *Mineral Resources of the Chemical Industries,* published in *Economic Geology,* May, 1939.

Approval Expected on Seasonal Exemptions for Surface Mines

AS a result of public hearings in Washington June 19 and 20, Elmer F. Andrews, administrator of the Wage and Hour Division, U. S. Department of Labor, is expected shortly to approve applications for seasonal exemptions under the Fair Labor Standards Act for surface-mining industries.

The hearing was granted following application for exemption of the industries quarrying stone and dredging and excavating sand and gravel and industrial sand from surface and open cuts, from the maximum-hours provisions of the labor standards act as industries of a seasonal nature, pursuant to Sec. 7 (b) (3) of the act and regulations.

The hearing was conducted by Harold Stein, assistant chief, Hearings and Exemption Section, Wage and Hour Division. He was assisted by Burton Seeley, exemptions examiner, Milton Denbo, assistant to the general counsel, and N. K. Harrington and Arthur Farber, members of the economic section.

Industry representatives at the hearings urged approval of the exemption contending that, because of seasonal characteristics peculiar to their operations, Sec. 526.3 of the wage-and-hours regulations is applicable. This section provides that an exemption on seasonal grounds is applicable to an industry which both "engages in the handling, extracting or processing of materials during a season occurring in a regularly, annually recurring part or parts of the year; and, ceases production, apart from work such as maintenance, repair, clerical and sales work, in the remainder of the year because of the fact that, owing to climate or other natural conditions, the materials handled, extracted or processed are not available in the remainder of the year."

The presentation of testimony by members of the National Sand & Gravel Association followed an introduction by V. P. Ahearn, executive secretary, who explained the circulation of a questionnaire designed to develop pertinent information from producers to support their application. Information covering 1936, 1937 and 1938, by months, was requested as to the number of employees, the man-hours worked, the average work-week, the plant-hours operated, and production. Stanton Walker, director of the research and engineering division of the association, explained.

Returns were received from 197 companies operating 245 plants in 37 states. Many companies refrained from filling out the questionnaire because of their conviction that their geographical location made their operations non-seasonal. The geographical subdivision proved to be one of the major points of discussion as each industry division presented claims for exemption.

For purposes of making the summaries, Mr. Walker said, the states were divided into four groups, each group including states of approximately similar seasonal characteristics. The danger of incorrect inferences being drawn from such groupings was realized, the witness admitted. He added that if "seasonal exemptions" are provided for on a geographical basis, a more detailed study would be necessary before fixing the boundaries of exempted areas. He agreed to endeavor to furnish additional information on the subject, at the suggestion of the hearing examiner.

To support their claim that their industry is a seasonal occupation, operated generally between April and November, sand-and-gravel witnesses presented an array of tables and charts containing information on the number of plant-hours in production, production, and the distribution of employment. It was contended that the operating season of plants averaged about seven months—from about the middle of April to mid-November—and that fewer than 1½ per cent. of the plant-hours were worked in the five remaining months.

In discussing the data on production it was agreed that because the information was substantially the same as that discussed under "plant-hours" the results were almost identical. As was brought out earlier, states in Groups 1, 2 and 3 showed marked seasonal characteristics, while no well-defined seasonal trend was apparent for the few states reported in Group 4.

Charts and tables were introduced containing information on the distribution of employment, and it was noted that only those employees engaged in production, maintenance and distribution were included in the tabulation; administrative and clerical workers were omitted.

It was observed that for the states in Groups 1, 2 and 3, "peak" employment occurred during the period of about June through September and that, during the winter and spring months, the number of men was reduced to about one-half or one-third of the peak. Further, it was contended, those men remaining on the pay-roll worked reduced hours.

In addition to the sand-and-gravel association officials, the industry was supported in its request by J. R. Thoenen, of the U. S. Bureau of Mines, and the following operators:

William Edward Hole, secretary, American Aggregates Corp., Greenville, O.; Irving Warner, vice-president, Warner Co., Philadelphia, Pa.; Henry N. Battjes, president, Grand Rapids Gravel Co., Grand Rapids, Mich.; S. C. Hadden, executive secretary, Indiana Mineral Aggregates Assn., Indianapolis, Ind.; and C. C. Slider, general superintendent, E. T. Slider Co., New Albany, Ind.

The industry operators presented a picture of their individual operations, and supported the association's application for exemption.

Otho M. Graves, president, General Crushed Stone Co., of Easton, Pa., directed the testimony of the National Crushed Stone Assn. witnesses.

Crushed stone, it was argued, is generally produced only from about April 1 to 15 to November 15 or December 1, a period of from seven to eight months. During the remaining four or five months of the year the plants and operations are substantially idle. It is factually true that "the handling, extracting, or processing of the materials of the industry occur at a regularly, annually recurring part of the year," they contended.

The quarries and plants "cease operations apart from work such as maintenance, repair, clerical and sales work" during regularly recurring periods of from November 15 to December 1 of one year to approximately April 1 to April 15 of the following year "because of the fact that owing to climate or other natural conditions the materials handled, extracted or processed" have no existing market.

"Climate" does prevent the operation of crushed-stone plants during "the remainder of the year," not so much because the material is "not available" but practically because of the lack of market and detriments to operations. Winter operations would definitely increase the cost and hazards of working and would not be industrially sound, the witnesses asserted.

It was explained that the carrying of nitroglycerin along the top of the quarry with uncertain footing from ice, or near the edge of the quarry face made invisible by snow, is a real hazard. Handling quarry tools and equipment with fingers numb from cold vastly increases the liability of personal injury, it was brought out. Other factors contributing to winter idleness, are:

(*Continued on page 84*)

Perspiring Solons Labor on as Few States Continue Sessions

By Z. H. MISCHKA

THE maze of proposed state legislation was further simplified last month as additional state law-making bodies completed their work and adjourned, first approving some additional measures concerning the industry and rejecting others. Only a handful of the 44 state legislative bodies that convened since the turn of the year continued in session beyond late June.

A state-by-state summary of legislative action on legislation follows. It treats measures enacted into law during the past month, proposals definitely rejected and bills remaining before law-making bodies at the time PIT AND QUARRY went to press.

California.—A proposed tax on natural resources was given little chance for passage as legislative leaders late in June pushed for adjournment. Still in the Assembly committee on revenue and taxation, where it was referred on its introduction last January, it would tax lime, limestone, silica and alumina used in the making of Portland cement at the rate of 15c. per bbl. of cement made from such materials; tax borates at $2.50 per ton, and all other natural resources severed from the land or water at the rate of 1 per cent. of their value at the quarry, pit, mine or other place of severance. It was intended to become effective January 1, 1940.

Illinois.—The Assembly passed and sent to the Senate, where it was given first reading after a favorable committee report, a bill to regulate the manufacture, possession, storage, transportation, sale or gift of explosives, repealing the present act. Administration, under terms of the bill, would be lodged with the department of mines and minerals.

The Senate gave second reading to a bill authorizing the state department of public works and buildings to enter into an agreement with any person, firm or corporation, municipal corporation or political subdivision of the state or federal government to take earth, stone, sand or gravel, or combinations thereof, from the bed or below the bed of any public waters in the state at a price of 6c. per cu.yd. Third reading was given by the upper house to a bill to prohibit the use of machinery in the production of crushed rock or other road material by convict labor. The use of such material made by convict labor would be limited to public institutions owned or managed and controlled by the state or for the improvement of public grounds owned or managed and controlled by the state.

Passed by the legislature and signed into law were bills liberalizing the unemployment-compensation law and extending its provisions to an estimated additional 70,000 workers. The bills make the law applicable to employers of 6 or more workers, in place of the present 8 or more, and increase the maximum weekly benefit under the law from $15 to $16 and fix the minimum weekly benefit at $7.

Meanwhile, in Rockford, Circuit Judge Arthur E. Fisher held unconstitutional the state workmen's occupational-diseases act which became effective October 1, 1931. The court, in an action that paves the way for a state supreme court review of the act, set aside an award of $4,795 previously made by the state industrial commission to an alleged silicosis sufferer against the Liberty Foundries Co., of Rockford. The circuit court held that it was arbitrary for the state legislature to attempt to say that a workman's last employer could be held liable for a disease an employee might have contracted during previous employment or otherwise.

Michigan.—A bill to make all occupational diseases compensable and to remove the present maximum limit of $3,000 compensation and to further liberalize the compensation statue in favor of the employee died in the Senate committee on labor with the adjournment of the legislature.

The legislature passed and the governor signed a bill requiring 5-day notice of an intent to strike. The legislation is intended to provide a "cooling off" period for mediation of industrial disputes.

New Jersey.—No action had been taken by the Assembly insurance committee on a bill seeking to provide that a claimant for compensation for compensable occupational diseases shall file his petition within two years from the time such claimant ceased to be exposed to such occupational disease. It was referred to the committee when introduced in January.

New York.—The legislature gave final approval to a bill that would provide that medical treatment rendered workmen disabled by dust diseases under the workmen's compensation law or, in lieu thereof, such hospitalization as may be allowed shall be limited to 90 days, which need not be continuous, and such treatment may be extended on order of the industrial board for a period not to exceed 180 days instead of 90 days. It was awaiting the governor's action.

After passing the Senate a bill died in Assembly committee that sought to provide that, where natural stone is specified in the construction of public buildings or works by the state or a municipal corporation, preference be given to such material mined, quarried or manufactured in the state and, if purchased from outside the state, the stone or granite must be in rough stock and fabricated within the state.

Other bills affecting the industry died in the committee to which they were referred on their introduction. They sought to authorize the conservation commissioner to fix rules and regulations for the sale of sand, gravel, stone and forest products on areas outside Adirondack and Catskill parks heretofore or hereafter acquired by the department for reforestation purposes; to permit a town superintendent with the approval of the town board to purchase gravel or stone for town highways from without the town and permit first-class towns to purchase land containing gravel beds at a total cost in excess of $1,000; to provide that in case of silicosis or other dust diseases compensation and benefits for disability and death shall increase at the rate of $100 each month for 48 months, instead of at rate of $50, the maximum compensation of $3,000 being stricken from the present statutes; and to increase from $3,000 to $7,100 the maximum aggregate total compensation allowed to a workman in silicosis or dust-disease cases.

Pennsylvania.—The legislature passed and sent to the governor for his approval companion bills to repeal the 1937 occupational-disease compensation act and to enact a new law covering the same question. The proposed new act would define the liability of an employer to pay damages for occupational disease contracted by an employee arising out of and in the course of employment and establish an elective schedule of compensation.

A bill requiring departments of state governments and political subdivisions of the state to give preference to materials mined and quarried in the state was lost when it died in committee at adjournment of the legislature.

In the face of vigorous opposition by both the A.F.L. and C.I.O. union groups, Governor Arthur H. James signed bills amending the state labor-relations act and repealing the anti-injunction law passed by the 1937 legislature. Amendments to the state's "little Wagner act" outlaw sit-down

strikes, allow either employers or employees to petition for collective-bargaining elections, and permit craft unions to be organized separately in plants already organized under a single industrial union. Repeal of the anti-injunction law permits courts to issue immediate restraining orders in labor disputes where it appears valid labor contracts have been violated.

Wisconsin.—By a vote of 57 to 29 the assembly indefinitely postponed a bill that sought to permit cities to engage in the production and distribution of stone, sand and gravel as well as to engage in other lines of business. The measure had been advanced as a means of decreasing unemployment through production-for-use projects.

Exemptions *(from page 82)*

Transportation of blasted material to the crusher; discomfort to employees who would be more liable than ordinarily to personal injury; and lack of market demand.

The principal markets for crushed stone are state highways and railroads, but construction and maintenance is not prosecuted during winter months, it was asserted. There are certain seasons of the year when highway construction can not proceed because the temperature is too low to secure satisfactory work; and railroads do not ballast their tracks during the winter because it would not be good engineering, and would be costly.

Witnesses for the crushed-stone industry, besides Mr. Graves, who is also a member of the executive committee of the National Crushed Stone Assn., were:

J. R. Boyd, the association's administrative director; A. T. Goldbeck, the association's engineering director; E. F. Kelley, chief, Bureau of Tests, U. S. Bureau of Public Roads; H. H. Wagner, general manager, Pennsylvania Stone Producers Assn.; E. T. Nettleton, secretary and engineering director, New York State Crushed Stone Assn.; S. M. Hadden, executive secretary, Indiana Mineral Aggregates Assn.; A. J. Cayia, general superintendent, Inland Lime & Stone Co., Company, Manistique, Mich.; A. L. Worthen, vice-president, New Haven Trap Rock Co., New Haven, Conn.; and Russell Rarey, vice-president, Marble Cliff Quarries Co., Columbus, O.

Two witnesses, L. H. Hayl, vice-president, Wyodak Chemical Co., Wyoming, and Paul Bechtner, president, American Colloid Co., Chicago, appeared in support of the requested exemption for the clay-mining industry.

The witnesses, both producers of bentonite clay, offered testimony on the unavailability of the material during unfavorable weather conditions. Bentonite, they said, as it is mined, contains broadly from 40 to 50 per cent. moisture, which creates a problem in unfavorable weather.

It might be assumed, they said, that the simple remedy would be the employment of additional labor during the season in which it is possible to conduct mining operations. But, they contended, that would not be possible without additional equipment, which would be too costly in view of unstable business conditions.

Paul S. Douglass, representing the slate industry in New York and Vermont, asked for exemptions for the dimension-stone industry, and presented testimony which may lead to new regulations by the Wage and Hour Division.

Mr. Douglass argued that climatic conditions in the region, including prolonged sub-zero weather, heavy snowfall and heavy rainfall during certain seasons of the year, create a situation in which the operations of the open-pit production process must be suspended "until the precarious whims of nature shift and permit operations to continue."

This hazard of weather, he contended, is a condition to which competitors in the field of roofing and slate products are not subjected. Whereas competing materials are manufactured by machine operations in factories where the elements of nature play no part and in which production is a minor factor; in the slate industry labor costs are the major factor.

The competitive price structure in the field is increasingly delicate, and an increase in the price of slate throws the demand to the manufactured products of competitors, decreasing employment and causing serious economic distress among slate makers, it was reminded.

Asking for relief and exemption from Sec. 7 (b) (3), the witness specifically asked federal authorization allowing employers to make up in a subsequent week time lost in a previous week. According to statistical experience, he said, such relief would amount to an extra day being worked approximately once in five weeks or an extra hour a day for the working week approximately once in five weeks, without the payment of overtime rates.

Time lost because of unfavorable weather conditions is no longer made up because the margin of price competition is such that the added cost of overtime results in production at a loss because the output is produced at increased costs, he said. The result is that men may be idle a few hours or days during unfavorable weather, but, having lost that time, have no opportunity to make it up in reasonable labor performance.

Mr. Stein, of the Wage and Hour Division, informed the industry representative that his discussion opened a new approach never considered when the regulations were drawn and suggested that additional arguments be submitted to Administrator Andrews for his consideration. Present regulations do not provide the exemption suggested by Mr. Douglass.

Organized labor, scheduled to be represented at the hearing failed to appear, although it was apparent from testimony that only a small percentage of the industry is unionized.

Clarence G. Campbell appeared as representative of the employees of the Sturgeon Bay Co., Sturgeon Bay, Wis., producers of crushed stone. He said:

"The men whom I represent believe that they are employed in a purely seasonal operation, that the hourly restriction of the Fair Labor Standards Act of 1938 will, unless consideration is given to the limited season of our employment, prevent us from providing for our livelihood during the four and one-half months of winter period during which, by reason of the peculiar employment conditions in the locality within which we reside, no other employment is obtainable. In fact, our restricted employment thus far during 1939 has already reduced the amounts which we have been able to lay aside for this purpose, and unless early relief from restricted hours and quick consideration for our particular situation is forthcoming, our means of livelihood for next winter will be a serious problem."

Representatives of the National Industrial Sand Assn., whose testimony coincided with previous arguments, were: L. M. Hansen, president, Industrial Silica Corp., Chicago, Ill.; J. M. Strouss, vice-president and general manager, Decker's Creek Sand Company, Morgantown, W. Va.; Charles J. Niesen, president, American Silica-Sand Company, Ottawa, Ill.; E. J. Beyer, vice-president, Michigan Silica Co., Rockwood, Mich.; and Emery M. Durstine, secretary-treasurer, Keener Sand & Clay Co., Columbus, O.

Throughout the hearing industry representatives commented on the congeniality and informality of the discussions as compared to the usual rough-shod fact-finding and straight-laced federal hearings. The friendliness of the officials representing the Wage and Hour Division brought several expressions of gratification from industry spokesmen after the hearing broadened at times to a round-table discussion of operating problems.

Federal representatives informed the industry that pertinent information in additional briefs may be filed for an additional ten days, and promised a finding in the matter in not less than six weeks, if the pressure of other matters does not prevent.

Personal Mention

E. Lee Heidenreich, formerly with the New York Trap Rock Corp., has become general superintendent and chief engineer of the Bituminous Rock Co. and the Bituminous Limestone Co., Cincinnati, O. A quarry and plant are being opened up at Hillsboro, O., and an older plant is being remodeled at Big Clifty, Ky.

Clarence Youngman, formerly manager of the Maunie Sand & Gravel Co., has opened a gravel plant about 1½ mi. south of Maunie, Ill.

M. T. Lindsey, for ten years sales representative for the Interlocking Stave Silo Co., Wichita, Kan., has gone into the concrete-silo stave business for himself and has opened a plant at Topeka, Kan. The new concern is known as the Kansas-Missouri Silo Co.

Roy Neher, formerly superintendent at the Clarence Center, N. Y., and Portsmouth, N. H., plants of the National Gypsum Co., has been made general superintendent of the company's new plant at Savannah, Ga., which started operating in May.

L. S. Fisher, head of the Camargo Sand & Gravel Co., Woodward, Okla., has been vacationing for several weeks after having been ill at his home for some time.

O. A. Walker has resigned as division engineer for the Oklahoma State Highway Department to become manager of the Muskogee Sand & Gravel Co. at Muskogee, Okla. He had been connected with the highway department since 1922.

M. A. Swayze, director of research, Lone Star Cement Corp., was elected a member of the executive committee of the A.S.T.M. on June 26 at the annual meeting held at Atlantic City. Mr. Swayze has been concerned with the fields of cement and concrete since 1912 when he was graduated from Case School of Applied Science. He was first with the Crescent Portland Cement Co. From 1913 to 1921 he was assistant and later chief chemist at the Houston plant, Texas Portland Cement Co. Then until 1929 he was chief chemist, Lone Star Cement Co., at Hudson, N. Y. Later he became assistant and chief chemist of the International Cement system which position he held until 1932 when he became chief chemist and research engineer of the Lone Star Cement Co. In 1938 he became the director of research.

F. L. Lancaster has assumed control of the L. & M. Stone Co., Utica, N. Y. Milo Crouse continues in charge of the quarry.

Malcolm McIntyre, sales manager of the Basalt Rock Co., Inc., Napa, Cal., was married June 4 at Reno, Nev., to Frances I. Carr of Vallejo, Cal.

Melvin H. Baker, president of the National Gypsum Co., has been elected president of the Buffalo, N. Y., Chamber of Commerce.

Earl N. Graf has been made manager of the Pittsburgh, Pa., branch of John A. Roebling's Sons Co. of Trenton, N. J., manufacturer of wire rope, wire cloth and related products.

Frank W. Klatt has returned to the W. W. Sly Mfg. Co., manufacturer of dust-control equipment, Cleveland, O., as general manager, a position that he formerly occupied from 1920 to 1927. In the intervening period he had been engaged in an executive capacity with one of the large automotive firms, principally in foreign countries.

R. W. Eichenberger, vice-president of Robins Conveying Belt Co., formerly acting as manager of the Chicago office has been transferred to the New York office at 15 Park Row where he will collaborate in general sales management for the company with H. Von Thaden, vice-president.

Bertrand Robinson, actively identified with various metallurgical and operating activities for some years, is now on the engineering and sales staff of

Bertrand Robinson

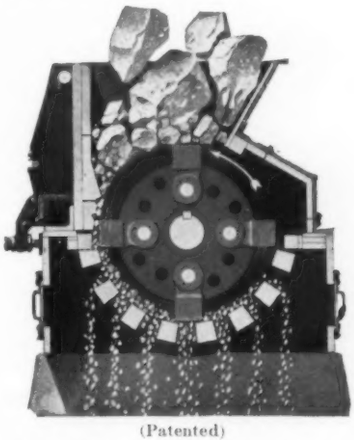
IT IS TRUE

MODERN, up-to-date Cement Plants are reducing steam shovel size limestone shale in one operation to 1½" and under suitable for storage and for blending as feed to raw grinding mills.

A large, Heavy Duty Hammer Crusher is used instead of several primary crushers. Heavy hammers swinging on shafts at high speed strike the huge rocks and break them into small fragments.

In most instances the cost of such a hammer crusher and its foundation is less than the cost of foundations required for the several primary crushers formerly considered necessary in a Cement Plant.

Initial cost of the crushing unit is less. Maintenance time and expense is reduced.



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ST. LOUIS

Hardinge Co., Inc. He will represent the company in Eastern Canada, with headquarters in Toronto. Until recently, he was with the Division of Metallic Minerals of the Department of Mines and Resources at Ottawa, Canada.

W. J. Westphalen, president and general manager of Laclede-Christy Clay Products Co., St. Louis, has been re-elected president of the American Refractories Institute.

Martin Carl Olson, formerly associated with the Lehon Co. for 16 years, more recently as advertising manager, has been appointed assistant manager, roofing and allied products department of the Celotex Corp., Chicago, Ill.

Luke E. Sawyer, formerly assistant general superintendent of the Babcock & Wilcox Tube Co., Beaver Falls, Pa., has been appointed general superintendent.

Harry Stocker, 42, president of the Stocker Gravel & Construction Co., Highland, Ill., ended his life by hanging in one of the plant buildings recently. He had been in ill health for some time and suffered a nervous breakdown this spring.

James B. Adams, 72, president and chief stockholder of the Longview-Saginaw Lime Works, Inc., Birmingham, Ala., died at his home in Birmingham, June 14, following a short illness. Long prominent in the Alabama industrial field, Mr. Adams leaves his wife and three daughters.

William Tanksley, 65, for the past 37 years mill foreman of the Lehigh Cement Co. plant at Mitchell, Ind., died recently at his home in Mitchell, following a heart attack.

John D. Brown, 42, engineer of bituminous research for the Michigan State Highway Department, died at Ann Arbor, Mich., May 31. He was graduated from the University of Michigan in 1922, and joined the highway department in 1934.

Joseph Milcarek, 28, a member of the firm of Milcarek Bros., concrete-block operators at Michigan City, Ind., met his death in an automobile accident near LaPorte, Ind., on June 11.

Thomas L. Barret, 60, for many years engaged in the building-supply business at Louisville, Ky., and a dealer in machinery and equipment, died of a heart attack at Louisville on June 5.

Paul Huycke, 68, well known Topeka, Kan., building-supplies dealer and a director of the Dewey Portland Cement Co., died recently.

Elmer W. Landis, 50, foreman for the Marble Cliff Quarries Co., Columbus, O., died recently of heart disease after a short illness.

Foreign Developments

Experiments on Lime from Dolomite Rock

The production of a ground building lime, with a residual carbon-dioxide content of 20 to 28 per cent. and with high strength from dolomite or dolomitic limestone, was described in *Tonindustrie-Zeitung*, 1934, No. 90, by Dr. Ing. L. Holleck. This material has been produced for a number of years by several firms, and is distinguished by a rapid hardening and by economy of use. Since its production requires only about 60 per cent. of the heat that would be required for complete liberation of the carbon dioxide, its possibilities for future development are very favorable.

The traditional shaft-kiln operation is not well adapted to the burning of this material because of the unevenness in the amount of carbon dioxide remaining in the lime passing through different zones of the kiln and in the large lumps. The rotary kiln is much more satisfactory because the rock is fed into it in small particles and because the temperature and other conditions can be controlled to produce a uniformly-burned lime. In an experimental rotary-kiln operation conducted by the writer (the kiln was 9 m. long and 0.40 m. in diameter, temperatures of 750 to 850 deg. C., oil firing) there was only 2 to 4 per cent. of difference in the residual carbon-dioxide content. How well the more recent types of kiln apparatus—the tunnel kiln and combined systems—would meet the requirements of this product would have to be determined by thorough investigations.

The material in the writer's investigations was a dolomitic limestone containing 46.5 per cent. CO_2, 0.84 per cent. SiO_2, 0.67 per cent. $Fe_2O_3 + Al_2O_3$, 34.6 per cent. CaO, 17.2 per cent. MgO, and 0.3 per cent.

K_2O. Even with a residual carbon-dioxide content of 27.5 per cent. and a fineness of grinding of about 14 per cent. residue on the 4900-mesh (per sq.cm.) screen, the 28-day air-storage test showed compressive strength of 42 to 44 kg. per sq.cm., and tensile strength of 8 to 9 kg. per sq.cm. Hydraulic properties could not be determined.—Albert Grimm in *Tonindustrie-Zeitung* 63:464-465, May 18, 1939.

Comparison of Sand Pit Test Drilling

To examine a prospective sand-and-gravel deposit it often happens that a series of test drillings are taken, as this method of sampling the pit is less expensive that sinking a shaft; however, this method also contains a risk that the materials brought up will not give an entirely accurate representation of the contents and condition of the deposit. Particularly in case of the finer fractions of sand there is a possibility of an alteration in the proportions of the various screen fractions. Also, the water and the disturbance caused by the drilling tools may cause a classification of the material by size and density, and the washing action may give an inaccurate picture of the content of clay or mud.

This article reports the results of some comparative tests on the gradation of the fine sand fractions as actually present in the deposit (brought up by digging) and as indicated by test drilling. The comparisons are charted, for each sand fraction, to show the degree and nature of the variation in the results.—H. Jüngst in *Steinbruch und Sandgrube* 38:153-156, May 20, 1939.

Hydraulic Properties of Blast-Furnace Slag

The research reported in this article applied modern methods of testing blast-furnace slag, and investigated the properties of the highly basic, latently hydraulic blast-furnace slag obtained in the production of various kinds of iron. The effect of the chemistry, the physical condition and the smelting temperature on the properties of the slags was studied. It was determined in these studies that the hardening capacity of the rapidly-cooled highly-basic blast-furnace slags depends more on the smelting temperature employed than on the chemistry. The hardening capacity of the slag increases with increasing temperature in the furnace process. Some properties of the slags, however, are also greatly influenced by the chemical composition, particularly by the ration of SiO_2 to Al_2O_3. With increasing silica content the strength in water increases, while strength in air lags, and

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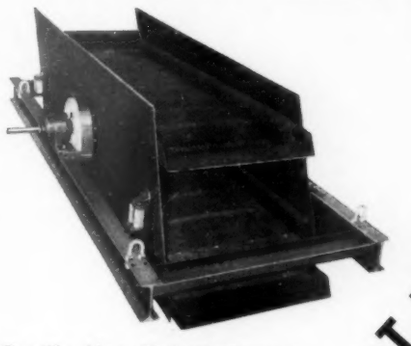

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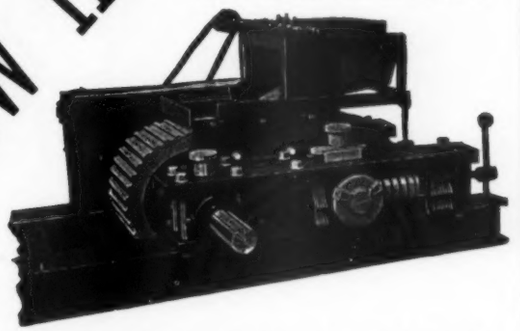

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The testing processes employed afford a good insight into the properties of blast-furnace slags. The rapid testing method which was employed can be recommended for demonstrating the reactive capacity of the highly-basic, rapidly-cooled blast-furnace slag of usual chemical composition.—G. Mussgnug in *Zement* 28:248-253, 261-268, 279-283, 293-298, April 20 and 27, May 4 and 11, 1939.

Occupational Diseases and the Law

Insurance

Prior to the decision of the Ohio Supreme Court in *Triff v. National Bronze & Aluminum Foundry Co.,* 135 O.S. 191 (PIT AND QUARRY, June, 1939, p. 59), it had been held by the courts of Ohio for many years that an employee had no right of action against his employer, who had complied with the Workmen's Compensation Act, for damages caused by occupational diseases, even though the Workmen's Compensation Act did not provide any award for such damages. In the *Triff* case the court concluded that the right of action of an employee for the negligence of his employer directly resulting in a non-compensable occupational disease was not taken away by Sec. 35, Art. II of the Constitution of Ohio, or by Sec. 1465-70, General Code, and that an action for wrongful death may be maintained by the personal representative of a deceased employee who died from a non-compensable occupational disease proximately caused by the negligence of the employer.

Since the commencement of the *Triff* case Sec. 1465-68a of the Ohio General Code has been amended so as to make silicosis compensable under certain circumstances. However, if these circumstances are not present, silicosis is not compensable and under the rule laid down in the *Triff* case, the employer would be liable for damages arising out of non-compensable silicosis caused by his negligence.

Subsequent to the *Triff* decision the Ohio Superintendent of Insurance asked the Attorney General for an opinion whether an insurance company authorized to do insurance business in Ohio, and whose charter and license would permit it to write employers' liability insurance, may write such insurance for Ohio employers to cover the liability for occupational diseases not covered by the Workmen's Compensation Law. In an opinion (No. 698), rendered June 1, 1939, the Ohio Attorney General rules that Sec. 1465-101 of the General Code would not render such insurance contracts void, and that insurance companies who are otherwise authorized may be properly licensed to issue employers' liability insurance policies insuring employers against liability to their employees for damages arising out of non-compensable occupational diseases caused by such employers' negligence.

Accidental Injury

Ross et al v. Ross et al., decided by the Supreme Court of Oklahoma, April 11, 1939, reported at 89 Pac. (2d) 338. Although the judgment in this case was to vacate an award of compensation, on the ground that the evidence showed only a temporary total disability, the court ruled that an injury caused by the inhalation of vapors, gas or dust may constitute an accidental injury compensable under the Oklahoma Workmen's Compensation Act.

It is a settled doctrine in Oklahoma that compensation may not be awarded for a disability which results from an occupational disease (*St. Louis Mining & Smelting Co. v. State Industrial Commission,* 113 Okl. 179, 241 Pac. 170; *United States Gypsum Co. v. McMichael,* 146 Okl. 74, 293 Pac. 773; *Imperial Ref. Co. v. Buck,* 155 Okl. 25, 7 Pac. (2d) 908; *Wilson & Co. v. McGee,* 163 Okl. 99, 21 Pac. (2d) 25). However, it is also a thoroughly settled doctrine that the benefits of the Oklahoma Workmen's Compensation Act (85 Okl. St. Ann. §1 et seq.) are not confined to cases of traumatic injury and that the inhalation of vapors, gas or dust may constitute a compensable injury (*Quality Milk Products Co. v. Linde,* 159 Okl. 256, 15 Pac. (2d) 58; *Johnson Oil Ref. Co. v. Guthrie,* 167 Okl. 83, 27 Pac. (2d) 814, 90 A. L. R. 616; *Tri-State Contractors v. Althouse,* 166 Okl. 296, 27 Pac. (2d) 1041).

Wrongful Death

Young v. Salt Lake City, decided by the Supreme Court of Utah, May 5, 1939; reported at 90 Pac. (2d) 174. This case was a suit by the mother of a laborer who was employed by Salt Lake City to paint trucks and died of lead poisoning, to recover damages from the city for the death of her son due to neglect of the city defendant.

The suit was under Sec. 104-3-11, Revised Statutes of Utah, 1933, the wrongful-death statute, and was instituted after the State Industrial Commission had rejected an application for compensation under Sec. 42-1-43 of the Workmen's Compensation Law, on the ground that the deceased's illness was an occupational disease and not within the provisions of that law.

The Workmen's Compensation Law, at Sec. 42-1-57, provides that the right to recover compensation thereunder is the exclusive remedy against the employer. In the lower court action, a demurrer to the complaint was sustained on account of this provision. The Supreme Court reverses that action, holding that under the facts alleged the death was due to an occupational disease, not compensable under the Workmen's Compensation Law, and that the plaintiff had a right of action for wrongful death due to defendant's negligence.

An occupational disease is held to be "one commonly recognized as incident to the usual performance of the occupation," and does not come within the coverage of the Workmen's Compensation Act as an accidental injury unless "some definite circumstance took place of an unexpected nature—something that broke, or injected itself into, the usual course of the performance of the occupation."

Traffic News Digest

LEGISLATION

Transportation Act 1939—In reporting favorably on Senate Bill 2009 details of which have been published in previous issues of PIT AND QUARRY, the Senate Interstate Commerce Committee used the following language:

The importance of a sound transportation system is recognized by all. It is likewise apparent to even the unobserving that this nation can not enjoy a sound transportation system if its most important carrier faces ruin and chaos. With one-third of the railroad mileage already in bankruptcy or receivership courts and with another third tottering on the verge of bankruptcy, action must be taken to preserve not only the railroads but the entire transportation system of this country.

It is intended that the act will be construed in the light of the declaration of policy—"It is hereby declared to be the national transportation policy of the Congress to provide for fair and impartial regulation of all modes of transportation subject to the provisions of this act, so administered as to recognize and preserve the inherent advantages of each; to promote safe, adequate, economical, and efficient service and foster sound economic conditions in transportation and among the several carriers; to encourage the establishment and maintenance of reasonable charges for transportation services, without unjust discriminations, undue preferences or advantages, or unfair or destructive competitive practices; and to encourage fair wages and equitable working conditions established through collective bargaining: all to the end of insuring the development and preservation of a national transportation system adequate at all times to meet most economically and efficiently the full needs of the commerce of the United States, of the postal service, and of the national defense."

Meritorious objections have been overcome. Suggestions which clarify have been adopted. The rate-making rule has been amended to expressly provide adequate safeguards for the public and at the same time the Commission is directed in prescribing a rate to consider only the particular carrier for which the rate is prescribed. That is, in prescribing a rate for water carriers the Commission will not consider the effect of that rate on either rail or motor carriers.

Enactment of the bill, S. 2009, should mean expedited and much more speedy consideration by the Interstate Commerce Commission of the matters that come before it.

For many years it has been the view of keen students of the transportation problem that there has been no consistent national policy with respect thereto. One reason urged in support of that view is that while the principal haulers of traffic and passengers, the railroads, have long been strictly regulated—as have, since 1935, motor trucks and busses engaged in interstate transportation—other forms of transportation are developed at public expense and without supervisory regulation. The net result of such a policy is inequality between various forms of transportation. As has been so often said, in 1887, when the original act to regulate commerce was passed, directed to correct abuses by railroads, the railroads had a monopoly on transportation. In later years competing forms of transportation have developed with such rapidity that no one now urges that there is any such monopoly. The railroads at first refused to treat these competing forms of transportation, particularly motor trucks, seriously and it was not until after much of their traffic and many of their passengers had been lured away that the railroads took drastic steps to recover the lost business. The sum and substance of the matter is that at the present time there is a plethora of transportation facilities, and under these circumstances it becomes apparent that some tribunal must be empowered with the authority to determine into what particular niche each form of transportation is best fitted, and to discourage other forms of transportation from entering therein. S. 2009 seeks to do this. It has also been urged, and it seems sound, that there is no equality in treatment when the railroads, and lately the motor vehicles, are strictly regulated, and other forms of transportation are regulated, if at all, to a much lesser extent.

The alternative is to greatly lessen the regulation with respect to railroads and motor vehicles or to increase regulation on other forms of transportation. It may be safely said that neither the strictly regulated railroads nor the motor-carrier operators favor the elimination of all regulation. Consequently the remaining remedy is to so extend regulation to competing forms of transportation, other than air, which only recently was placed under the Civil Aeronautics Authority, and retaining to each such lawful advantages as are inherent therein, so as to, as nearly as possible, equalize them and put them on a common footing, at least from a regulation standpoint. This is not for the purpose of favoring one form of transportation over another or seeking to put any form of transportation out of business; it is, as stated, simply to put them all on a common basis or com-

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mon starting point in their sharp struggle for business. S. 2009 seeks to do this also. If one or more forms of transportation can not survive under equality of regulation, they are not entitled to survive. This is not railroad philosophy; it is transportation philosophy. The problem is not a railroad problem, but is, as the Interstate Commerce Commission has said, a transportation problem.

During the Seventy-fourth and Seventy-fifth Congresses the Senate Committee on Interstate Commerce conducted extensive hearings on the proposed repeal of the long-and-short-haul clause of section 4 of the Interstate Commerce Act. Various opponents declared that its repeal would mean destruction of water carriers by the railroads. During the hearings on S. 2009 it was admitted by opponents of the bill that railroads free from any regulation could destroy or seriously impair the business of its competitors. It is necessary then to regulate rail carriers to insure a sound transportation system for this nation. And the position taken by water carriers that railroads must be regulated, and they should not, though they compete on rights-of-way improved and largely maintained by public funds, is wholly inconsistent and completely untenable.

During the Seventy-fourth Congress the Senate Committee on Interstate Commerce conducted extensive public hearings on a bill regulating water carriers. In the Seventy-fifth Congress the same water carrier regulation bill was introduced and for the second time the Senate committee authorized a favorable report. The language applicable to water carriers in the bill, S. 2009, has been largely taken from this previously considered legislation. The Congress has considered water regulation since 1935, the President recommended enactment of such legislation during the year 1935 and the Congress has considered such legislation since 1935. Twice have hearings been held, but yet its opponents are heard to say, "that the Congress has not had time to study water regulation legislation."

This bill states, in section 1, a declaration of policy in the light of which it is to be administered. It imposes upon the Interstate Commerce Commission the duty of regulating all common carriers, including those by railroad, by water, by motor vehicle, by pipe line, and express companies and sleeping-car companies, engaged in transportation subject to the Interstate Commerce Act. The Interstate Commerce Commission is also given jurisdiction over contract carriers by water and by motor vehicle, as well as of brokers engaged in the service of arranging any transportation subject to the act, excluding, of course, employees of the carriers. The present provisions of the Interstate Commerce Act have been redrafted in what is considered a more logical and orderly manner so as to apply to the newly regulated carriers, saving so far as possible the existing language so that full advantage may be taken of the many interpretations, both judicial and administrative, which have been put upon the respective sections. The long-and-short-haul clause amended only to provide an expedited procedure satisfactory to leading opponents of long-and-short-haul repeal, has been retained and made applicable to other forms of transportation; the Commission is directed to inquire into the management of various forms of transportation and is given full access to records, accounts, etc., to enable it to execute and enforce the provisions of the act; the safety requirement of the act both with respect to railroad and motor-vehicle employees and operations have been retained. Important, too, is the direction imposed upon a transportation board, of temporary nature, to study the question of whether one form of transportation is subsidized as against another by grants of public funds or donations of public property.

For the first time, also, the rights of employees are specifically recognized, both in the declaration of policy and in the substantive provisions of the law for it is provided by section 25(3) of the bill that "representatives of employees of a carrier duly designated as such for the purpose of collective bargaining as to wages, hours, and other conditions of employment may intervene and shall be heard in any proceeding under this act affecting such employees."

This requires the Commission to hear such employee representatives in cases of proposed consolidations, mergers, or other forms of unification of properties, as well as in cases where railroads subject to the act are seeking to abandon branch or other lines. This is important progress in regulatory legislation. Prohibitions in the present act against unjust and unreasonable rates and fares, forbidding undue prejudices and unjust discriminations have been retained and broadened. The commodities clause, forbidding a carrier by railroad to transport any article or commodity in which it has an interest direct or indirect, with certain exceptions not very material, has been retained. The Commission's authority to prescribe through routes and fix joint rates and the divisions thereof, is preserved and broadened and its complete authority with respect to filing of tariffs and schedules by common carriers and by contract carriers, and the rejection thereof, is brought forward into this bill. The provisions for free passes and reduced rates on government property are not disturbed. Executive officers of employee organizations are under certain circumstances brought within the class of persons entitled to free passes. Combinations to prevent continuous carriage of freight are prohibited. Commission authority is also required for the issuance of securities, for the pooling of traffic, and for almost any form of unification, consolidation, or merger. The Commission's authority to prescribe maximum and minimum rates is extended so as to enable it to prescribe minimum rates for all forms of transportation, including water carriers. The Commission's authority to suspend and investigate proposed increased rates, applicable to rail and motor carriers, has been broadened to include other forms of transportation, and has been made applicable to reductions as well as increases. In this way, it is expected rate wars may be reached in their inception.

This bill also brings forth, and in many respects strengthens, present provisions of the law respecting the furnishing of adequate car service, and facilities for interchange of traffic; preserves the shipper's right to route his traffic and provides for paying of allowances to any shipper supplying a part of the transportation service it is the carrier's duty to furnish, punishes a carrier for unauthorized disclosure of information relating to shipments committed to its custody; preserves and broadens the carrier's liability for loss and damage to shipments; continues and extends the Commission's authority to award damages for violations of the act, and analogous to one of the recommendations of the Committee of Six, shortens the period within which claims for such damages must be filed; authorizes the Commission to fix charges for depreciation by carriers and forbids any other such charges; retains the present set-up and arrangement for selection of members of the Interstate Commerce Commission; authorizes the Commission to create divisions of its members, assign work thereto, as well as to assign duties to boards of employees of the Commission and to individual Commissioners; retains the present joint-board procedure in motor-carriers cases, and, carrying out a recommendation in the Commission's last annual report to Congress, authorizes the Commission to pay the subsistence and travel expenses of members of state commissions sitting with the Interstate Commerce Commission in cooperative proceedings under the act. The bill further provides for the reporting by the Commission, with appropriate findings, of its decisions, and makes provision for review thereof. Despite the insistence of the rail carriers, and of the recommendation of the Committee of Six, it makes no change in the rate-making rule now contained in section 15a of the Interstate Commerce Act, except broadening it to apply to all carriers. Section 15a is now applicable only to rail carriers.

The Commission's authority to deal with intrastate rates which unduly discriminate against interstate commerce has not been changed; that is such authority has not been extended to the rates of motor carriers or water carriers. The valuation section of the act has been preserved, as have the sections relating to licenses for brokers, for transfer, suspension, or revocation of licenses, permits, and certificates previously granted by the Commission. The bill, for the first time, imposes upon water carriers the duty of securing certificates of convenience and necessity before commencing new operations and this section applies to both common carriers and contract carriers. The act punishes attempts to bribe agents of carriers in an effort to secure preferential treatment by shippers, and repeals the Hoch-Smith resolution of 1925, long advocated by the Commission. Penalties provided by the act have to some extent been lessened, the thought being that a penalty provided for a large railroad corporation would be unreasonable when applied to a violation by a small motor-truck operator. Another important addition to the act authorizes the Commission when it appears that domestic water carriers are unduly discriminated against by practices of foreign water carriers,

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to relieve such domestic carriers from such unfair competition by granting relief from the act's requirements to the extent the Commission finds it necessary. A through-routes provision long advocated by the Commission has been inserted. The Commission also is authorized in cases where general rate increases are allowed, to pool the revenues resulting therefrom and prevent rich roads from sharing therein. Certain limited jurisdiction over companies furnishing private cars to railroads and over forwarding companies is for the first time conferred on the Commission.

This report was filed on May 16 and the bill was taken up for debate on May 22. The following amendment was approved:

"Provided, however, that nothing in this act shall apply to contract carriers by water in the transportation of commodities in bulk on the Great Lakes whose vessels during the normal course of voyage pass within the international waters between the United States and Canada, and whose vessels compete in respect to the transportation of any such commodities in bulk with water carriers of a foreign country."

The following rate making rule was substituted by the Senate for the one contained in the original bill:

"It shall be the duty of the Commission in the exercise of its power to prescribe just and reasonable rates, to give due consideration, among other factors, to the effect of rates on the movement of traffic by the carrier or carriers for which the rates are prescribed; to the need in the public interest, of adequate and efficient transportation service by such carrier or carriers at the lowest cost consistent with the furnishing of such service; and to the need of revenues sufficient to enable such carrier or carriers under honest, economical, and efficient management to provide such service. When used in this section the term 'rates' means rates, fares, and charges and all regulations and practices relating thereto. In order that the public at large may enjoy the benefit and economy afforded by each type of transportation, the Commission shall permit each type of carrier or carriers to reduce rates so long as such rates maintain a compensatory return to the carrier or carriers after taking into consideration overhead and all other elements entering into the cost to the carrier or carriers for the service rendered."

On the afternoon of May 25 the Senate passed the bill by a vote of 70 to 6. The bill now goes to the House for approval.

Transit Privileges—The following bill has been introduced in the House by Representative McLaughlin, of Nebraska, as H. R. 6,371 and in the Senate by Senator Burke, of Nebraska as S. 2,444: "For the purposes of this paragraph, the granting of transit privileges to any locality, port, port district, gateway, or transit point, upon any route over which such through rates have been or shall be established and the denial of like transit point upon such route and port, port district, gateway, or transit point upon such route and under the same through rate, shall be deemed to be an undue or unreasonable prejudice or disadvantage to the locality, port, port district, gateway, or transit point denied such privileges."

NEW COMPLAINT FILED

Gypsum Lath—Reduced rates on gypsum lath in carloads between points in Southern territory applying from Savannah, Ga. where a new plant was recently established by National Gypsum Co. and from Jacksonville, Fla., where a new mill was recently built by the United States Gypsum Co. have been filed by Southern carriers. Representative proposed reductions include a reduction in the rate from Savannah to Charlotte, N. C. from 28 c. to 22 c. and from Jacksonville, Fla. to Charlotte, N. C. from 35 c. to 27 c. The rate from Savannah to Memphis, Tenn. is pro-

HAVE YOU CONSIDERED A PAGE WALKING DRAGLINE FOR YOUR JOB?

Machine illustrated, Page Walker with 160 foot boom, 8 cubic yard bucket, all electric powered. Owned by Swift & Co., at work stripping phosphate near Bartow, Fla.

High Yardage Dragline, Diesel or Electric Powered, 3½ Cubic Yard Capacity and Larger

Page Walkers are completely modern, rugged dragline machines, with fast load, hoist and swing speeds.

The large circular base and the *positive crank action walking mechanism* not only give more freedom from ground and weather conditions but assure immediate movability in any direction.

Before buying any dragline, check thoroughly the Page Walker in a size for your job! Address Box S.

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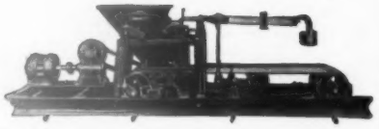

Weighing and proportioning material with 99% accuracy, Schaffer Poidometers are recognized throughout the cement industry as important equipment in modern plant control.

Schaffer Poidometers are automatic in action and will operate continuously or, with a mechanical weighmaster attachment, will provide batch operation.

This efficient weighing equipment is now saving thousands of dollars throughout the cement industry. Many leading plants are now saving money while obtaining greater efficiency with Schaffer Poidometers. Let us help solve your proportioning and feeding problems. *Write for catalog No. 5.*

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posed to be reduced from 45 c. to 35 c. and from Jacksonville, Fla. to Memphis from 45 c. to 35 c. These schedules were published in supplements No. 17, 19 and 20 to Agent E. H. Dulaney's Exceptions to Southern Classification I.C.C. 77 and M.F.—I.C.C., Supplement 46 to Agent F. D. Miller's tariff I.C.C. 213 and Supplement 45 to M.F.—I.C.C. 6, and other tariffs. The Commission has suspended these schedules from May 29 until December 29 on all rail traffic and until August 27 on joint rail-motor traffic in I.C.C. Docket No. 1 and S. 4,635 and 4,636.

OTHER TRAFFIC NEWS

Rule 10 Revision—To the revision of rule 10 of the Official Classification as mentioned in the June issue of PIT AND QUARRY, which would provide that in mixed carloads shipped by one shipper on one day to one consignee to one destination, each item in the car would be subject to the carload rate on that commodity with the carload minimum weight being the highest applicable to any item in the car, opposition has developed from some members of the lumber industry. It is their contention that if this change is adopted it will be possible for producers of ready-cut houses and mail-order concerns to drive the retail lumber dealer out of business by shipping all of the materials for a house in one car at the carload rate applicable on each commodity.

New Machinery and Supplies

A new combination shovel, drag-line and crane in the 1 to 1¼-cu.yd. class has been announced by the Osgood Co., Marion, O.

This new machine is designated as Type 60, and is available with 20-ft. boom, 16-ft. handle, 1-cu.yd. dipper, 100-hp. gasoline motor, 11-ft. 10-in. crawlers, and as the Model 605 with 21-ft. boom, 16-ft. handle, 1¼-cu.yd. dipper, 120-hp. gasoline motor, 12-ft. 3-in. crawlers. Diesel power may be substituted for gasoline.

While many new features are found in the Type 60, several Osgood features such as unit cast steel construction, "Servo" control of drum-shaft clutches, vacuum control of swing and travel clutches, safety fuel tank, high-pressure lubrication, silent-chain power transmission, etc., are incorporated in the machine.

Small combination excavator.

All high-speed shafts are mounted in anti-friction bearings. The vertical-swing shaft has square section, top and bottom, and no keys are used. Mitre and spur gears above deck are of alloy steel, teeth cut from solid blanks, and heat treated.

A new feature on the Type 60 is the bolting-on of clutch and brake housings on the drum shaft. The drums are of cast steel, the housings of close-grain nickel-iron, highly polished. Bands of the outside, contracting type are in halves for easy replacement, and lined with molded blocks.

In shovel service an independent chain crowd unit is mounted on the main body casting. Crowd is powerful and retract is fast. The chain sprocket at the boom foot is in line with the boom foot hinge pins, and therefore the crowd chain tension is self adjusting to all boom angles. The crowd chain has a tensile strength of 75,000 lb.

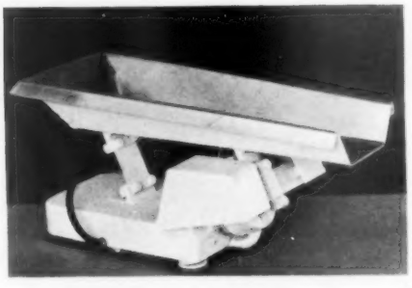
Shovel boom and handle are of all-steel box girder type, electrically welded. The dipper has a renewable lip and reversible teeth and is tripped by vacuum.

● Feeder

The Syntron Co., Homer City, Pa., has announced a new, small model of vibratory feeder for controlling the flow of bulk solids.

Rated at a capacity of handling as much as 2,000 lbs. per hr. of 100-lb. material such as sand, this feeder is the smallest model in the line and is intended for small, finely-controlled feeds of down to a few pounds per hour, such as is required to feed chemical reagents, articles to inspection belts, material to automatic weighing machines, etc.

The vibratory feeder is made up of a sheet-metal trough 18 in. long by 3 in. wide, with tapered sides from rear to front, mounted on springs and actuated by a pulsating electro-magnet. Control of the rate of flow is accomplished by regulating the vibratory action through a rheostat in the separate controller supplied with each feeder. The controller, which also contains the operating switch and a thermionic valve, is arranged for separate, remote wall mounting.



Small vibrating feeder.

Identified as the Model F-O, this small feeder, with its controller, provide a finger-tip control of the rate of flow of solids with an entire absence of moving and wearing parts, such as motors, screws, belts, disks, etc.

● Diaphragm Pump

Improvements in the design of the diaphragm pump made by Hardinge Co., Inc., York, Pa., provides users with new operating advantages.

The mechanical design is such that the length of the stroke, or pump capacity, may be varied without stopping the pump, itself. The advantage of this feature is obvious in cases where even slight variations in required

Improved diaphragm pump.

capacity occur. In addition, the pump provides unusually rugged construction, insuring long service, and the bearings are so located that any splash on them from the pulp being pumped is eliminated, and danger of undue wear or abrasion is removed.

The lower valve is of smaller diameter than the upper valve and, consequently, may be easily removed through the upper one, for examination or replacement, when abrasive pulps are being handled.

The illustration shows the general arrangement of the pump which can be obtained with a motor drive unit, or arranged for belt drive.

Hardinge diaphragm pumps have been installed with rubber covering on the pump body and valves, or of some special material construction, for the handling of corrosive mixtures.

Most installations have been for handling under-flow from thickeners, and many of these Hardinge diaphragm pumps are handling pulps running 60 per cent. or more, solids.

• Excavator

A new ½-cu.yd. and a new ⅜-cu.yd. convertible crawler power shovel were announced recently by the Byers Machine Co., Ravenna, O.

Model 65, the new half-yard, weighs 30,000 lb., is powered by a 50-h.p., 6-cyl. motor and has a safe crane lifting capacity of 12,500 lb. at 10-ft. radius on a 30-ft. boom.

Model 75, the new five-eighth yard, weighs 32,500 lb., has a 60-h.p., 6-cyl. motor and lifts 13,000 lb.

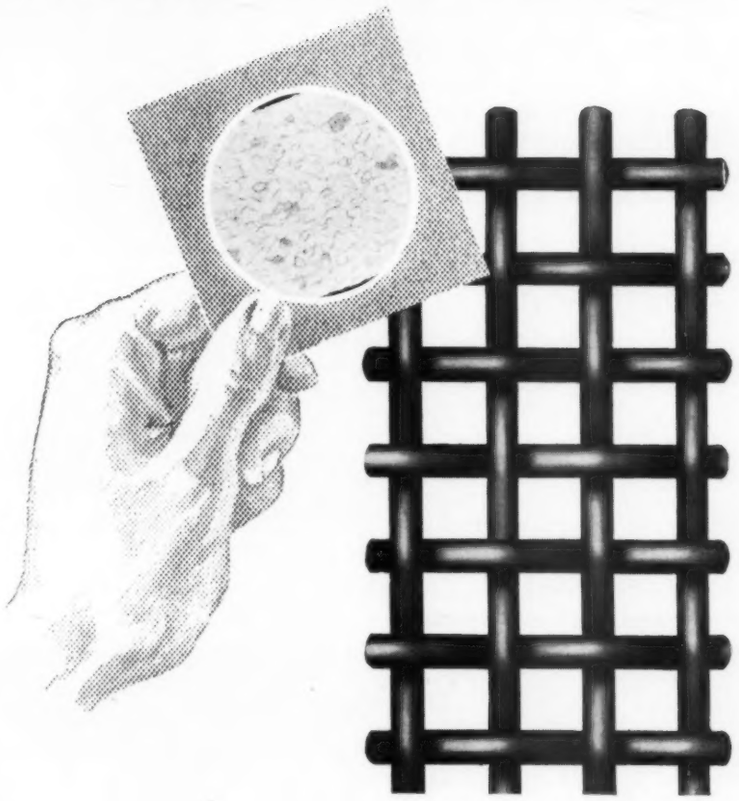
In new catalogs issued on these models, features include four hook rollers on the turntable, roller bearings on major shafts, unit alloy steel casting construction, positive independent cable or chain crowd shovel attachments, increased speeds, scientifically ventilated cabs and ability to swing while travelling.

On crane or drag-line operation, these models always have travel clutches ready for immediate engagement, thus providing a time saving advantage.

• Sludge Pump

A new portable air-operated sludge pump which works on the ejector principle has just been introduced by the Chicago Pneumatic Tool Co., New York, N. Y. Compressed air flows through an air inlet, creating a vacuum which sucks water through the inlet until a float valve in the drum shuts off the air discharge. The air is then forced into the drum

YOU CAN'T FOOL THE *METALLOSCOPE!*



THIS photograph of a section of Roebling Steel Screening Wire was taken in the Roebling Research Laboratory with a photomicrographic camera. It tells a real story to our metallurgists and research men. It indicates instantly and accurately that here is a wire extremely tough and strong—one that will stand up under severest vibration and abrasion!

Hundreds of these photographs—of hundreds of different steels—are on file in our research laboratory. They are tangible evidence of the constant research—the constant effort on a planned basis that is carried on in the Roebling Research Laboratory—to make certain that in Roebling Wire Screening you will always obtain the maximum of lasting, economical service.

We invite your inquiry regarding Roebling Wire Screening for any sizing, cleaning or grading service. It is made in many types and in many metals.

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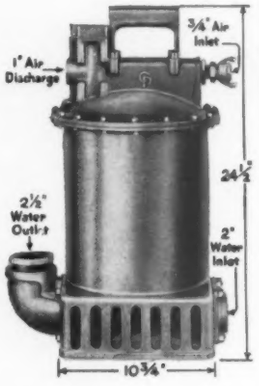
ESTABLISHED 1881

instead of out the air discharge, and the pressure thus created forces the water out of the water discharge. This gives a pulsating flow much the same as a hand-pump.

The pump has high lift capacity, low air consumption, handles up to 15 per cent. of solids, and handles water containing sand or rock-drill cuttings without causing rapid wear of expensive replacement parts.

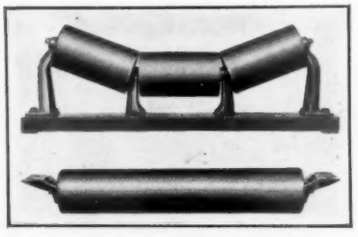


Air-operated sludge pump.

• Idler

Improved roller-bearing troughing and return idlers have just been introduced by the Robins Conveying Belt Co., New York, N. Y.

The malleable-iron supporting brackets are of streamlined design and crescent section, giving maximum strength and pleasing appearance. The triple-seal assembly prevents escape of grease or the entrance of grit or moisture. These seals are used in both the troughing and return idlers, as also is the Robins patented single-shot lubricating system, whereby all bearings are completely lubricated by one application of a grease gun on either one of the two end fittings.



Troughing and return idlers.

The troughing-idler shaft-and-pulley assembly may be completely dismantled and reassembled without the use of tools. The return-idler shaft-and-pulley assembly may be lifted out between the conveyor stringers for inspection or adjustment and may be easily replaced without disturbing the bracket connections.

• Mechanical Trap

Users of compressed air in all branches of industry will be interested to know of the recent development by the Armstrong Machine Works, Three Rivers, Mich., of an automatic "snap-action" mechanical trap for draining water from compressed air lines, tanks, separators, and aftercoolers. The principal advantages claimed for the device are immunity to ordinary dirt troubles, ability to discharge water without any loss of air, positive opening and closing of discharge valve, and freedom from need for priming.

As shown in the cross-section diagram, the trap has a ball float which is connected to the short valve lever through a flat strip of stainless spring steel. In the closed position, this spring is bowed downward. As water enters

Under the present upward trend in the building industry, producers and dealers are again finding it profitable to use the crawler-mounted clamshell. Its speed and capacity for hard work, coupled with its efficiency on short jobs as well as long runs, make its use an economy over that of old-fashioned or out-moded machines and methods. The illustration shows a P&H Model 355 clamshell, moving gravel from the cars to the bin. Powered by a gasoline engine, it uses only 3 gal. of gasoline per hr. and handles over 500 cu. yd. of sand and gravel in an 8-hr. day.

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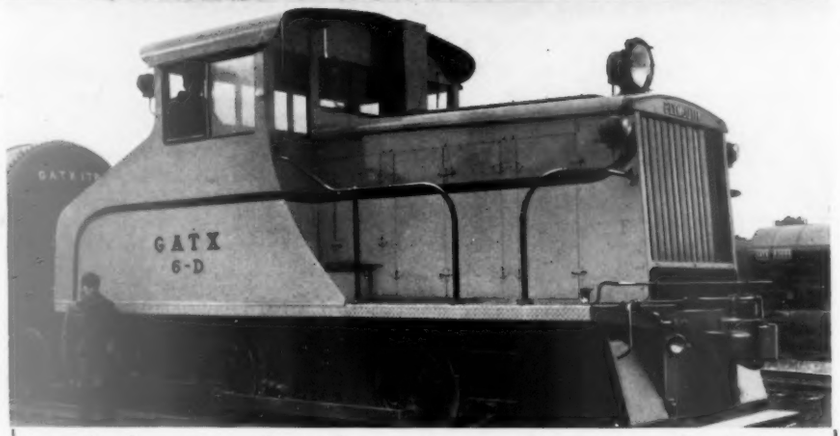

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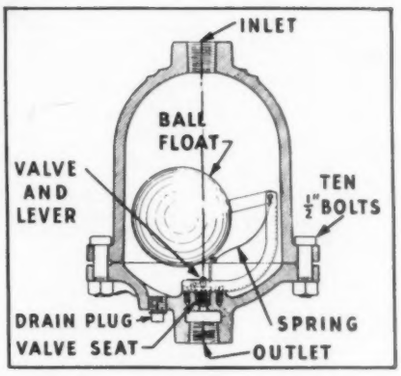


Diagram of the automatic trap.

the body of the trap, the ball float rises—bending and storing up energy in the spring. Just before the ball float reaches the top of the trap, the spring bends past dead-center and the stored-up energy snaps the valve wide open. In this position, the spring is bowed upward. As the water level drops in the trap body, the cycle is reversed and the valve snaps shut. It is this quick, forceful closing that prevents pieces of dirt from getting lodged in the valve and causing leakage.

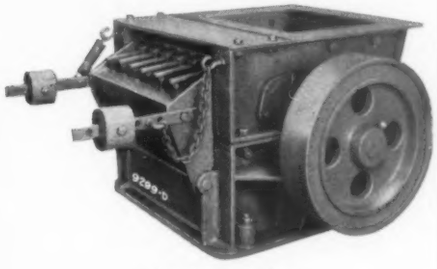
The capacity claimed by the maker is 1400 lb. of water per hour at 125 lb. pressure and 1000 lb. per hour at 250 lb. pressure.

• Ring Crusher

Just announced by Stephens-Adamson Mfg. Co., Aurora, Ill., is a new ring-type crusher, featuring triangular-shaped, manganese-steel sectors operating so as to *crack* large pieces rather than crush them.

The cracking action minimizes pulverizing to reduce the volume of fines.

The new line is already being marketed in sizes to handle lumps of all types of bulk



Ring-type crusher.

materials, including gravel and stone, ranging in size from 6 in. to 26 in.

The combined improvements of the new triangular sector and the use of only two gangs of sectors on the rotor, allow handling of larger lumps in a given size machine than was formerly possible.

The centrifugal action of the sectors automatically presents the least worn surface of this triangular manganese-steel part for crushing duty.

Any unit in this new line of crushers can be furnished with or without apron fingers to eliminate automatically tramp iron or other foreign materials.

The Link-Belt Co. announces that in the process of broadening its line of modern power transmission equipment, the Twin Disc Clutch Company, Racine, Wis., has appointed it distributor for Twin Disc friction clutches and clutch couplings in all industrial fields.

• Excavator

A new 2-cu. yd. power shovel, the 44-B, is being offered by the Bucyrus-Erie Co., South Milwaukee, Wis. This new machine is available with gasoline, Diesel, or electric power and can be converted for use as shovel, drag-line, clam-shell, or crane.

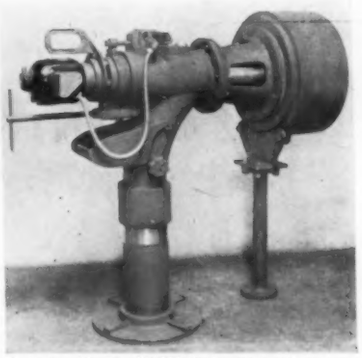
A new type chain crowd has been incorporated into the 44-B. According to the manufacturer, the new crowd will provide powerful crowd-out and high-speed retract, saving time on every digging cycle. Crowd, hoist, and swing are synchronized to give maximum output in all kinds of digging. A light, strong front end affords the user exceptionally wide working ranges; and big sheaves increase rope life and provide favorable digging angles.

The manufacturer has given special attention to the dipper. A short back, curved door, and smooth inside which flares outward

New 2-cu.yd. power shovel.

CALOREX REG. U.S. PAT. OFF.

BURNERS for LIQUEFIED and GASEOUS FUELS



Calorex Model R-2000 industrial rotary-cup, low-pressure air-atomizing type burner.

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THAT spiral lap welded seam reinforces each length of Taylor Spiral Pipe from end to end—gives it strength beyond that of any pipe of its weight. In Taylor Pipe the pitch of the spiral is carefully selected for each group of sizes to give the proper structural strength for the given pipe diameter, as shown above.

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to the bottom all assure fast, clean dumping action. The 44-B dipper will handle oversize easily; and due to the dipper's welded alloy steel construction, the owner can be certain of getting topnotch service under the most severe digging conditions. The dipper is equipped with inserted Beco Tiger teeth made of tough, forged-tool steel, which are both reversible and replaceable.

Trade Literature

Anaconda Rubber Insulated Power Cable. 54 p. Anaconda Wire & Cable Co., New York, N. Y.

Bonney Wrenches and Tools. 92 p. (Catalog No. 39) Bonney Forge & Tool Works, Allentown, Pa.

Whitewash and Cold-Water Paints. 16 p. National Lime Assn., Washington, D. C.

Simplicity Gyrating Screens. 4 p. Simplicity Engineering Co., Durand, Mich.

Newhouse Crushers. 16 p. (Bulletin 1469E) Allis-Chalmers Mfg. Co., Milwaukee, Wis.

All-Star Line of Concrete-Products Plant Equipment. 4 p. *21 Advantages to You.* (folder). Besser Mfg. Co., Alpena, Mich.

Conco Torpedo Electric Hoist. 4 p. Conco Engineering Wks., Mendota, Ill.

700 Cu.Ft. Portable Diesel Driven Compressor. 8 p. Chicago Pneumatic Tool Co., New York, N. Y.

Caterpillar D7 Diesel Tractor. 32 p. Caterpillar Tractor Co., Peoria, Ill.

Hydraulic Diesel Nozzle Tester. (folder). Buda Co., Harvey, Ill.

Used and Rebuilt Power Equipment. 8 p. Chicago Electric Co., Chicago, Ill.

Universal—For Every Crushing Purpose. 12 p. Universal Crusher Co., Cedar Rapids, Ia.

Concrete Shore Protection. 32 p. Portland Cement Assn., Chicago, Ill.

Conveyor Belt Carriers. 4 p. McNally-Pittsburg Co., Pittsburg, Kan.

General Catalog No. 87. 960 p. Jeffrey Mfg. Co., Columbus, O.

Saco Speed Reducers. 8 p. Stephens-Adamson Mfg. Co., Aurora, Ill.

McGill Precision Bearings. 52 p. McGill Mfg. Co., Valparaiso, Ind.

Dunbrik and Dunstone for Beauty, Permanence, Low Cost. 16 p. W. E. Dunn Mfg. Co., Holland, Mich.

Okolite Insulated Cables. 8 p. Okonite Co., Passaic, N. J.

Worthington Feather-Valve Compressors. 8 p. Worthington Pump & Machinery Corp., Harrison, N. J.

Waylite-Superock Plan Book. 28 p. Waylite-Superock Co., Chicago, Ill.

Industrial Head and Eye Protection. 48 p. Chicago Eye Shield Co., Chicago, Ill.

L-R Flexible Couplings. 20 p. Lovejoy Flexible Coupling Co., Chicago, Ill.

Vari-Pitch Texrope Sheaves. 16 p. *Utah Electro-Magnetic Feeders, Conveyors, Screens.* 12 p. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Rebuilt Electrical and Power Equipment. 8 p. Chicago Electric Co., Chicago, Ill.

Just as the wind fills all sails as easily as one, so the Tri-Vibe feature of the Type C LEAHY No-Blind Screen *triple powers* every square inch of the free-swinging screen jacket with dynamic differential vibration . . . yet requires only one-half horsepower! This increased efficiency in *fine screening*, plus greater economy in operation, is demonstrated daily in hundreds of LEAHY-equipped plants.

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INCORPORATIONS

THORNTON QUARRIES CORP., Chicago, Ill. 50,000 shares $1 common, 1,680 shares $100 class A, 2,320 shares class B. Correspondent: Schradzke & Johnnsen, 33 N. LaSalle St.

MITCHELL ROCK & SAND CO., Mitchell, S. D. Capital: $25,000. Incorporators: C. L. Althen, R. E. Coyne, J. J. Stephens, S. H. Bruyh, and Hans Hansen.

BELL SAND & GRAVEL CO., Milwaukie, Ore. L. William Schuld and B. M. Schuld.

MISSISSIPPI BENTONITE CO., Charleston, Miss. Incorporators: J. W. Saunders and H. M. Euart.

NATIONAL CONCRETE CO., Seminole, Okla. Capital: $25,000. Incorporators: J. L. White, F. G. Sarber, W. J. Albright and W. M. Haulsee.

AIR CITY CONCRETE CO., Dayton, O. 500 shares n.p.v. Incorporators: Lena Ayres, George A. Heck and Harmon W. Ayres.

EASTERN CONCRETE PIPE CO., New Haven, Conn. Authorized capital $50,000. Incorporators: William J. Smith, George J. Smith, and George A. DiCenzo.

CONTEE SAND & GRAVEL CO., Laurel, Md. 100 shares n.p.v. Incorporators: Abe Gudelsky, Ida Gudelsky and Harry Gudelsky.

READY-MIX CONCRETE CO., Davenport, Ia. Authorized capital $25,000. Incorporators: C. A. Mainwarinf, F. O. Block, and R. B. Swift.

HOMEWOOD SAND & GRAVEL CO., Chicago, Ill. 10 shares n.p.v. Incorporators: F. DeYoung, M. P. McElwee and T. Miedema. Correspondent: Samuel J. Horwitz, 134 N. LaSalle St.

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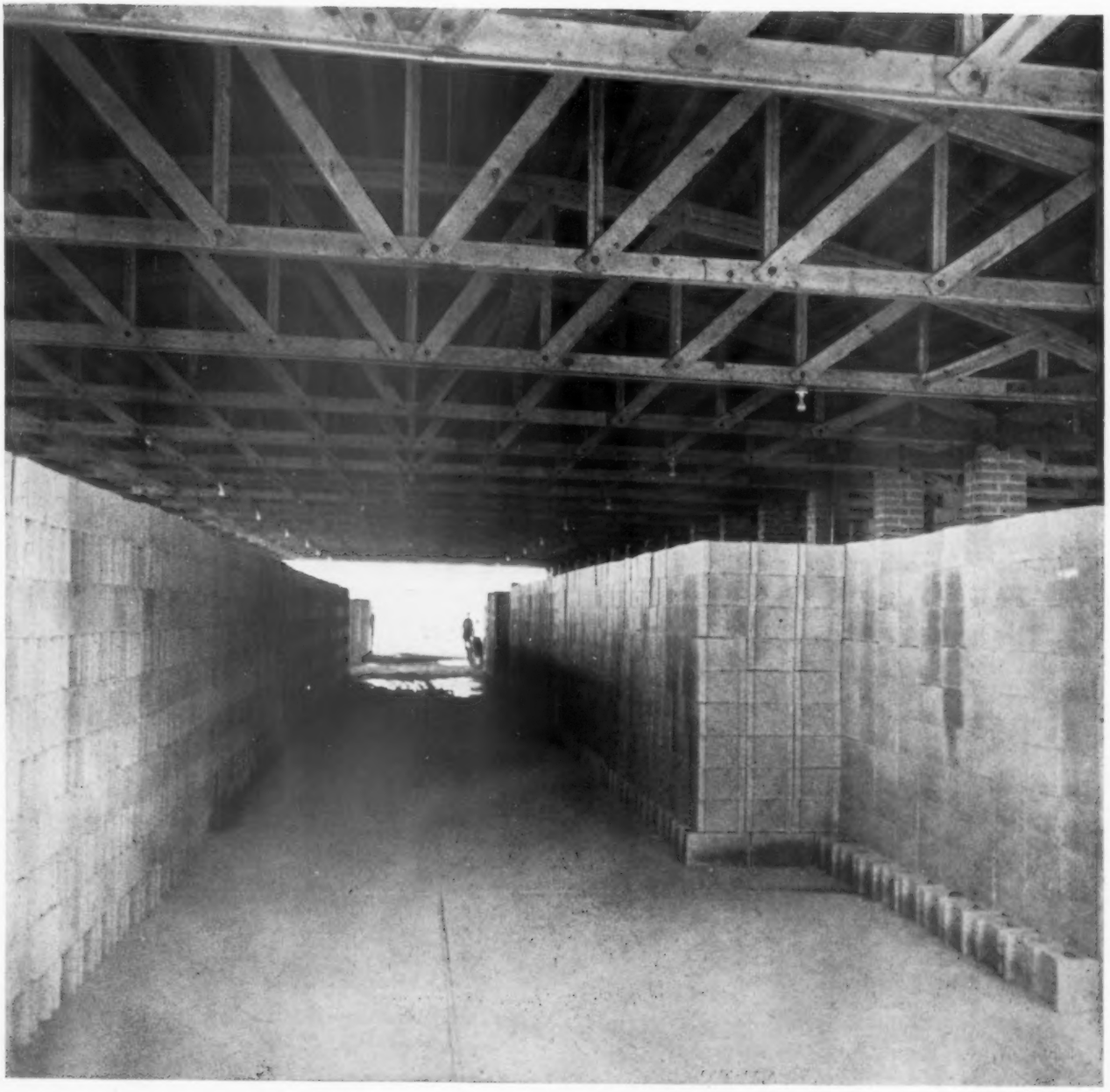


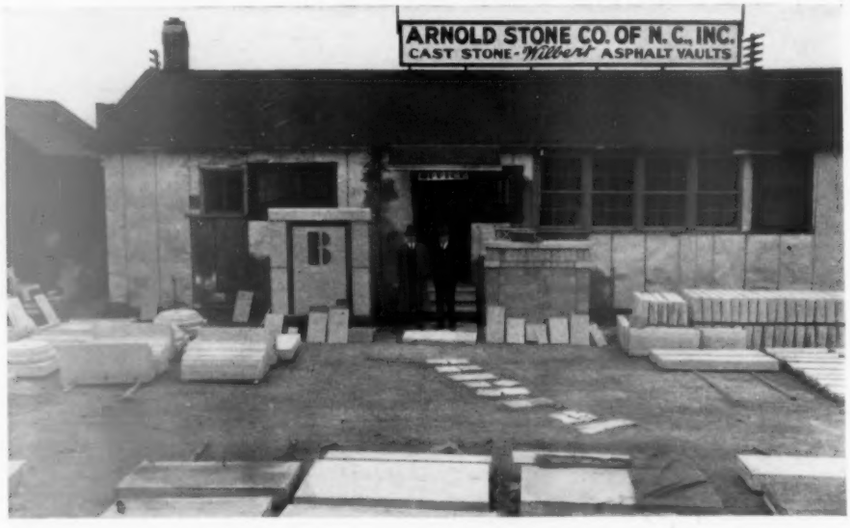
Covered storage of 1,000,000 block capacity at plant of Currier Lumber Co., Detroit, Mich. (Story on page 104.)

By W. E. TRAUFFER

Forceful Selling Builds Successful Cast-Stone, Burial-Vault Business

RECENTLY, while on a trip through the southeast, the writer went through the growing industrial city of Greensboro, N. C. and took this opportunity to call on M. A. Arnold, president of the Arnold Stone Co. of North Carolina. After observing the methods used and the policies followed in its business it was easy to understand why this company has been so successful in the concrete-products field and why Mr. Arnold was elected president of the Cast Stone Institute at its meeting in Chicago last February. The name of the company gives a clue to one of the important reasons. The company's main product, according to Mr. Arnold, is stone, not artificial stone, simulated stone or even cast stone. He believes it to be a building material second to none, which does not need to imitate any other product and is perfectly capable of standing on its own merits.

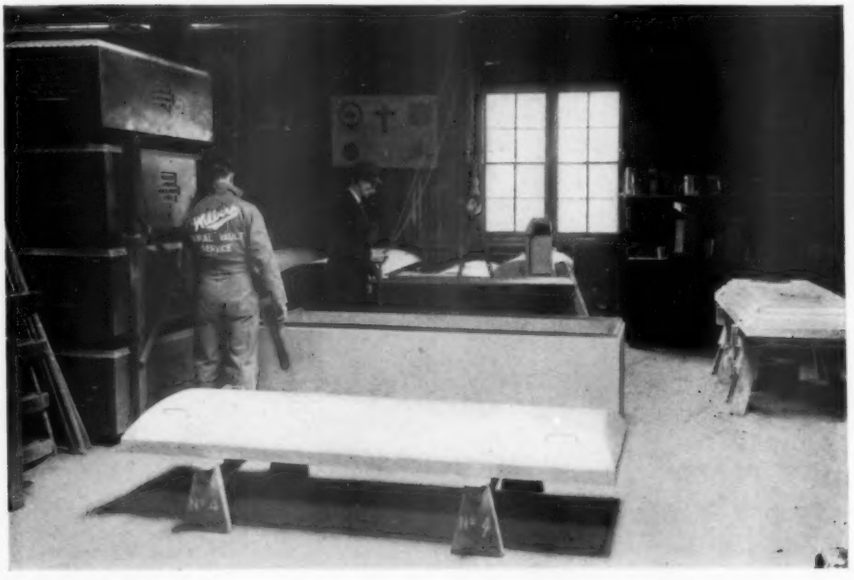
Mr. Arnold, although still well under the half-century mark, is one of the pioneers of the cast-stone industry on this continent, having been practically born and raised in this business. His father, J. M. Arnold, started a cast-stone business in Auer, Germany, in 1930 and in 1909 moved to Winnipeg, Manitoba, where he produced the first commercial cut cast stone in Canada. It was there that M. A. Arnold first participated actively in the business. Things went along well until 1916, when the World War practically put a stop to building. The business was then moved to Jacksonville, Fla., where suitable aggregates were available. Florida was developing rapidly at that time and the business prospered. As a growing percentage of the stone produced was being shipped to the Carolinas and Virginia, a branch plant was established at Greensboro in 1929 to serve this area. The combined effect of the collapse of the Florida boom and the depression cut the business at the Jacksonville plant to a fraction of its former volume, so this plant was abandoned and operations were concentrated at Greensboro.



The office and some of the cast-stone products on display. Mr. Arnold and Mr. Schlag are standing before the door.

Another view in the vault department showing the finishing and spray-coating operations.

At this plant all efforts were at first centered on cast stone. In 1932 the company secured a franchise for the manufacture and sale of Wilbert asphalt burial vaults for most of North Carolina. This business has grown from an average of 4 vaults per month in 1932 to an average of nearly 50 vaults per month at present. In 1936



Finishing up one of the vaults. Supt. W. E. Wuensche is moving a small vault into place.

precast-concrete roof slabs of the company's design were added. The 1938 volume was 50,000 sq.ft. and the end is not yet in sight. In 1938 light-weight concrete blocks were added to the line.

Mr. Arnold is thoroughly convinced of the benefits accruing to the members of the Cast Stone Institute. All its members regularly submit for testing samples of the materials used in large projects. The results of these tests are sent to the architects as proof that specifications have been met. According to Mr. Arnold, this service, together with the manufacture of a consistently high-grade product by its members, has made architects throughout the country aware of the fact that membership in the institute is a guarantee of high-quality products.

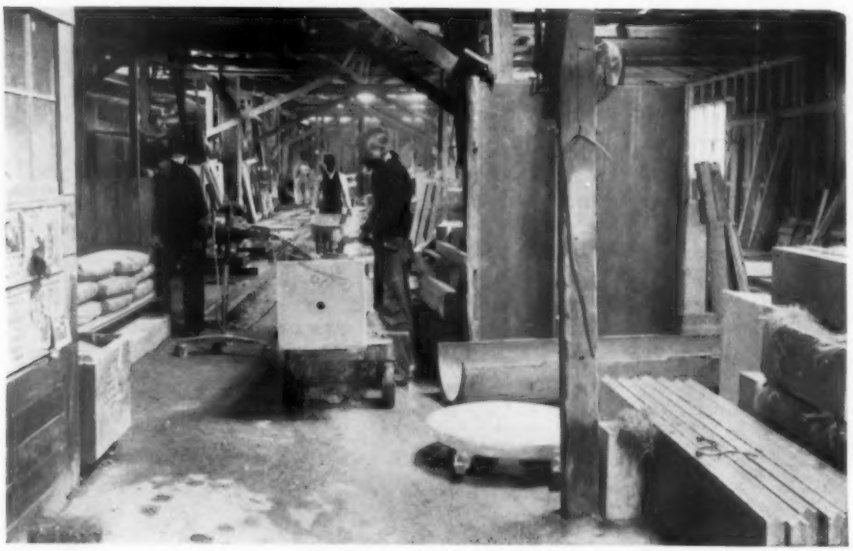
Stripper which makes light-weight blocks.

All the selling of the company's products is done by Mr. Arnold and J. H. Schlag, vice-president of the company. The cast stone is usually sold through architects who have become thoroughly familiar with the company's product. The quality of its product is considered to be the company's best sales argument and adherence to this principle has built up a large repeat-order business.

No attempt is made to imitate natural stone or to compete with inferior grades. Usually cast stone can equal or beat the price of natural stone, according to Mr. Arnold, and it can be made in colors and textures not available in the natural stone. This product can be made in such a wide range of surfaces, textures, colors, etc., that individual artistic ideas of architects can be followed. These advantages over natural stone have attracted architects to this product and consistent high quality has held their business.

This stone has been supplied for many large and small projects scattered over a wide area. Among the recent jobs was a $200,000 teacher's college building at Greenville, N. C. and a $300,000 courthouse at Kingston, N. C. The company also supplied stone for the entire facade of a new $250,000 department store in Greensboro.

The concrete used for cast stone is mixed in three Blystone 7-ft. and 9-ft. mixers. Crushed granite and marble are in greatest favor for coarse aggregates and clean sharp sand is used. The forms are built to the architect's design and the units are poured and tamped face down. Compressed-air equipment is used for tamping and also for grinding and polishing. Several woodworking machines, planers, bandsaws, etc. are used to make the wooden forms. A Yale chain hoist on an overhead monorail is used to handle the finished units, which are moved into the yard on hand trucks after they are thoroughly cured.

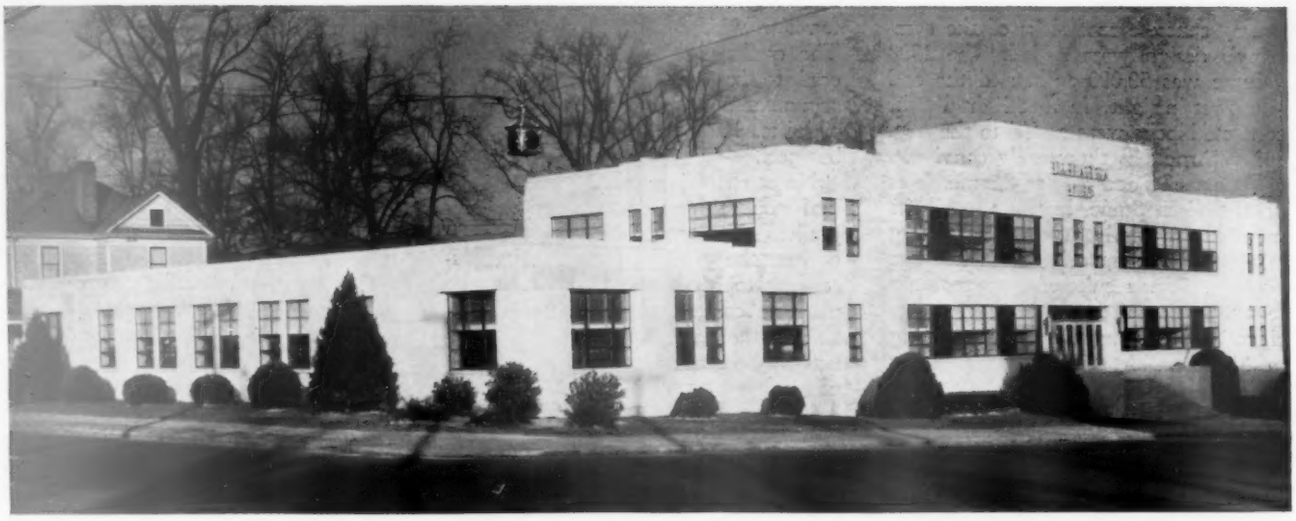


Workman, wearing respirator, finishing a lighting standard with a flexible-shaft grinder.

Storage-yard view showing some of the pieces manufactured.

While cut cast stone is still in greatest demand Mr. Arnold states that there is a distinct trend toward a mosaic type of stone which can be made in a variety of colors and textures. There is also a growing demand for thinner and larger slabs of mosaic to be used as a veneer backed up with brick or reinforced concrete. This product is particularly suitable for remodeling buildings, a field as yet untouched, according to Mr. Arnold.

This mosaic surface is obtained by spreading coarse aggregate in the bottom of the form and pouring the concrete on top of it. After the unit is partially hardened and removed from the form the surface is brushed off and acid is used to get a rough-textured effect. This surface is also ground down when a rubbed and polished surface is desired.



New Burlington Mills office building in Greensboro faced with Arnold cast stone.

The concrete blocks are made with a mixture of Superock slag aggregates and some natural sand. A standard block made of this material weighs about 35 lb. and is nailable. The Superock is received in cars on a siding and the sand by truck-loads from local pits. A Stearns 12-cu.ft. mixer is used to mix the concrete and the blocks are made by a Multiplex stripper block machine. A rubber-tired cart is used to carry the finished blocks to storage where they are sprayed for 3 or 4 days before being moved outdoors. High-early-strength cement is used and the blocks test from 700 to 900 lb. per sq. in. of gross area in 3 days.

The demand for these blocks keeps the machine operating at capacity, which is about 500 standard blocks daily. About 90 per cent. of the output is used for exposed work and 10 per cent. for back-up. These blocks are used in the construction of all types of buildings including colleges, churches, theaters, residences, etc. A carborundum machine is used to finish some of these blocks for use in decorating the interiors of auditoriums, class-rooms, houses, etc.

The vaults are made by the Wilbert patented method. Double forms are first used to pour the ⅜-in. thick asphalt shell. The outer form is then removed and after being given a special bonding treating the shell with its outer form intact is placed in a steel form with the concrete reinforcing in place. The 2-in. concrete shell is then poured and vibrated with a Bramford air vibrator attached to the form. After curing for two days the inner and outer forms are removed. The concrete outer shell is then sprayed with a special asphalt sealing coat and cured for another 30 days before shipping. Various spray finishes are used including silver, gold and copper and the vaults are decorated as desired.

The concrete used in these vaults is made with granite chips and sharp sand and is mixed in a 1-bag job mixer. A 1:2½ mix is used and the concrete tests over 6,000 lb. per sq.in. A full-size finished vault weighs 1,700 lb. These vaults are sold only through funeral directors but are delivered and put in place by the company. Three flat-body trucks are used for this purpose and also for delivering other products.

Both Mr. Arnold and Mr. Schlag have sufficient faith in their products to use them in their own houses which were built less than a year ago. These houses have concrete basements, precast concrete joists and floors, concrete-block walls and cement-asbestos shingles. One of the houses has a ground-finish block interior, attractively tinted. The only wood used in either of these buildings is in the roof trusses. These houses get the lowest insurance rate in the city and, according to Mr. Arnold, cost only 10 per cent. more to build than an all-wood and brick-veneer house of the same design. Retail prices were used in making this comparison.

Standardized Concrete Shapes Aim of New Pittsburgh Firm

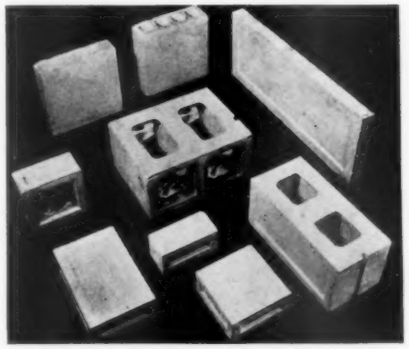
A program for the nation-wide standardization of precast concrete shapes, not only as to size but also as to the qualities of appearance, weatherability and strength, was recently announced by the Cemenstone Corp., Pittsburgh, Pa.

Shapes will be standardized the same as with structural steel and will be manufactured with a mill similar to a steel mill in its cycles of production. It employs newly-patented principles of precast concrete manufacture.

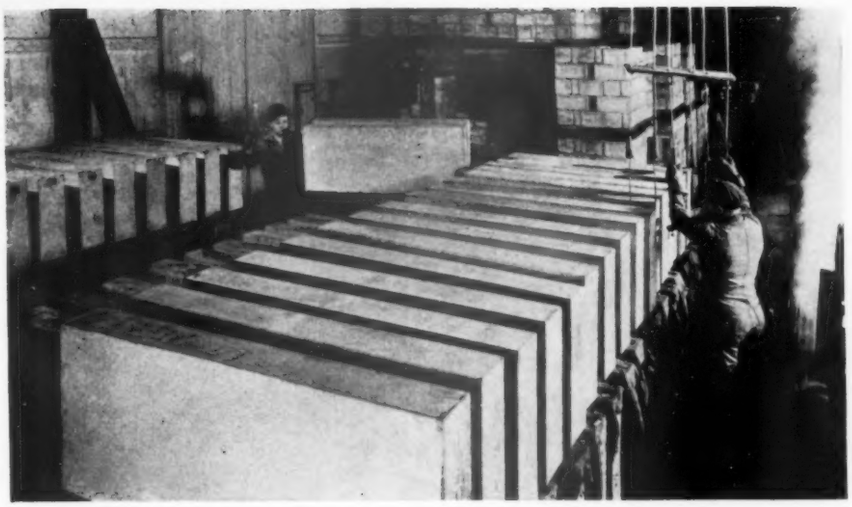
The D. J. Kennedy Co. of Pittsburgh is the corporation's first licensee and has just gone into steady production.

W. P. Witherow, founder of the Witherow Steel Corp. and president of Blaw-Knox Co. is chairman of the Cemenstone board. Leslie M. Johnston, former vice-president and general manager of the A. M. Byers Co., is president, and Albert Henderson, who has been superintendent of construction on a number of the largest building projects in the United States during the past 20 years, developed the system and is the corporation's consulting engineer.

The Cemenstone Corp. will supply its patented equipment to licensees in designated areas throughout the United States who will be granted exclusive rights to manufacture, under the company's patents and its trademark "Cemenstone." Products will be made ac-



Representative products include paneled block, solid and hollow partition units, veneering slabs and glass-inset block.



Precast curbing being removed from the forming machine.

cording to the corporation's established standards of quality.

Mr. Johnston says that by this means it will be possible for architects, contractors and owners to obtain products of known quality and utilization throughout the United States.

He says that in the past nearly all concrete products have suffered through lack of standardization, not only as to sizes of units but as to comparative appearance, weatherability and strength. He also states that this situation has resulted in limited applications and in varying degrees of acceptance according to the quality of the products in a given community. Production has been laborious and costly in the past because, he says, manufacturers of precast concrete have been compelled to purchase a different piece of equipment to make practically every product. With the Cemenstone system every type of concrete unit can be produced with the same general equipment. He also states:

"Throughout the recent depression many authorities have contended that one of the basic problems of our nation is the high cost of distribution, and that decentralization of industry would help solve this problem. By having our products manufactured in plants strategically located in every principal community throughout the United States, and with 85 per cent. of the raw materials available near each plant, we will almost entirely eliminate a major factor in concrete building materials costs, that of freight charges, which are high on such bulky and heavy products. We place the manufacturer at his market.

"There are some who feel, also, that industrial units should be smaller. If this is true we have provided encouragement for such development by making it possible for a great many persons to have their own businesses, protected by exclusive territories and aided by the nation-wide advertising of the corporation and the advantage of its experience and the experience of all the other individuals who are engaged in making Cemenstone products. We also make it possible to embark in the building materials business without prohibitive initial outlay."

Mr. Johnston further feels that the appearance, quality and adaptability of these new precast concrete products will find wide acceptance in the residential building field. With them, he says, there are no limitations on design or construction details, and building costs and upkeep will be reduced.

The system provides for standards of size and quality in precast concrete such as have been developed for steel. These concrete units also have been coördinated with standard steel construction elements for the first time in the history of the use of either steel or concrete in building, says Mr. Johnston. As a result of these developments, Mr. Johnston believes that the company will lead the way to the first integration of the concrete-products industry.

Stock-pile of 5-ft. slabs.

Use of vibration, heat and mass production methods are the three main features of the system. Vibration while molding produces a fine texture and a stronger product. Heat is used to hasten the chemical reaction of the cement when it is brought in contact with the other materials and water. It also induces uniform shrinkage and a product of a uniform light color. Mass production has been made possible by the development of a system which permits rapid cycles of manufacture and the making of several shapes at one operation. The method of molding, curing and aging produces units with sharp edges and corners.

Among the products which can be produced by this method are blocks for wall construction and channel-shaped, short-span slabs for floors and roofs, as well as long-span slabs, concrete planks, joists, bricks, insulating tiles, and veneering, also curbs, sidewalks, fence posts. The veneering will be capable of taking a large number of surface treatments. In addition to being cast in colors, their surfaces can receive stains or paints satisfactorily and other materials can be molded to their surfaces. It also is planned to produce blocks inset with glass panels so that they will not only be load bearing wall units but will admit light. They will be developed for air-conditioned buildings and for structures which require the elimination of outside dirt and dust and to admit light through basement wall structures. Another type of product, made of Portland cement, expanded by the addition of aluminum powder to make it highly cellular, has high insulating qualities and weighs only one-fourth as much as ordinary concrete.

Universal-Atlas Duluth Plant Wins Safety Award

For the third time the Duluth, Minn., plant of the Universal Atlas Cement Co., was declared the winner of the C. E. Carlson Safety award, and at a recent meeting of the Duluth Industrial Safety School was awarded permanent possession of the trophy, which was accepted on behalf of the company by John E. Carlson, safety manager.

Several years ago the plant gained permanent possession of the W. A. McGonagle Duluth safety trophy and in 1937 it was awarded the Joseph A. Holmes Safety Assn. national certificate of honor for operating 1,515 consecutive days, or over four years, without a single lost-time accident. In addition to these awards, the same plant, on seven different occasions, has been awarded the safety trophy of the Portland Cement Assn. for operating an entire calendar year without a lost-time accident.

LEFT—Plant, storage yard, and one of the semi-trailer delivery trucks of the Blissfield Builders Supply Co. BELOW—Dump truck delivering load of gravel to elevator hopper.

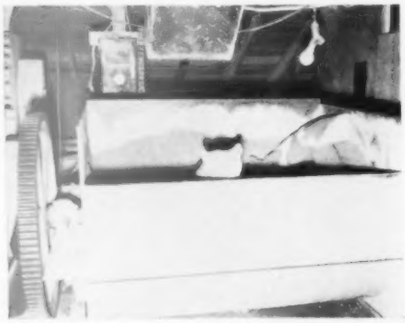
Aggressive Firm in Town of 2,000 Making $350 Worth of Blocks Daily

ONE would scarcely expect to find, in a town of 2,000 population, a concrete-products plant quite as modern and with as large a production capacity as that of the Blissfield Builders Supply Co. at Blissfield, Mich. But, because it serves a score or more of small towns within a radius of 50 mi. and sells a considerable share of its output in Toledo, O., and vicinity the plant has been operating close to its capacity of 3,200 units per 8-hr. day. It is using up-to-date vibrating equipment and accepted curing procedure to turn out a high-quality product. Forceful selling methods, too, naturally play an important *rôle* in its success.

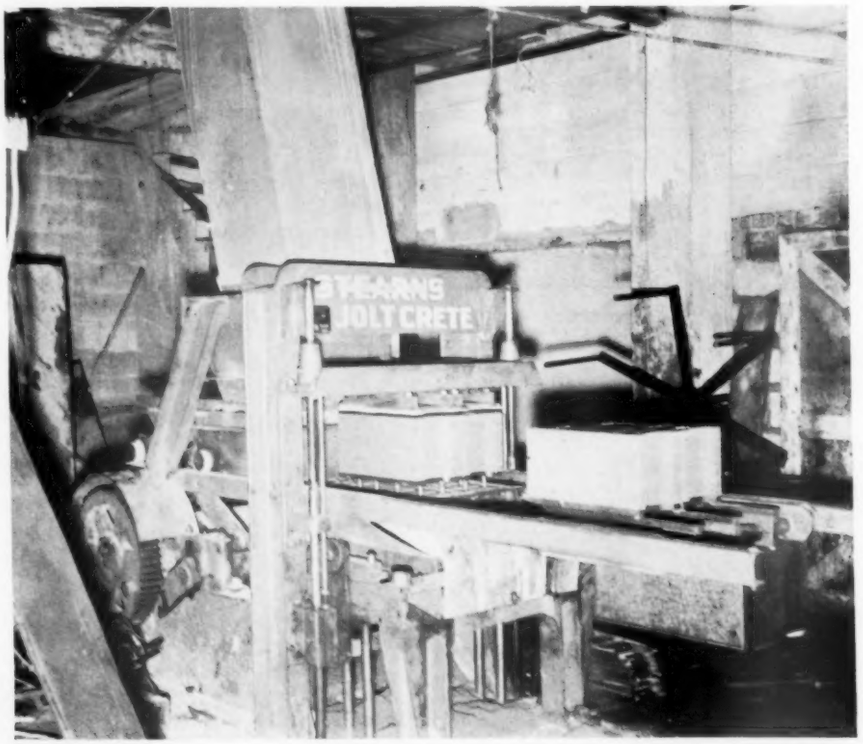
Early this spring the company abandoned its old power tamper and installed a Stearns No. 7 Joltcrete machine. This is a smaller unit than the original No. 9 Joltcrete, making 7 blocks per min. compared with 9 on the larger machine. Otherwise it is the same, employing the same principle of limited-amplitude vibration under pressure and the same automatic cycle, producing dense, true units with fully-pressed tops.

The Blissfield concern gets its gravel from the plant of the Tecumseh Sand & Gravel Co. at Tecumseh, Mich., the producer delivering the material by dump truck. An open belt-bucket elevator transfers it from the receiving hopper to an overhead bin where it is fed by a chute to the Stearns batch mixer over the Joltcrete machine.

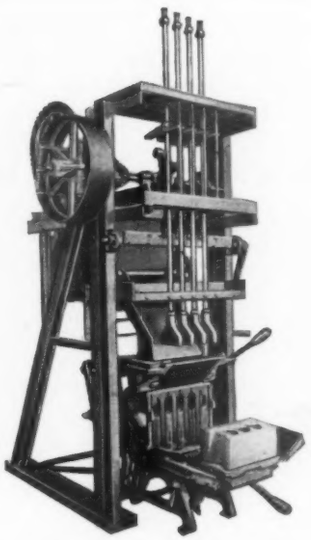
At present, only gravel-concrete blocks are being made but by early fall the company hopes to devote considerable time to the manufacture of cinder units. The cinders will be obtained from the Toledo industrial district where a stockpile of crushed-and-screened product is now being built up.



The batch mixer which feeds the new block machine shown at the right.



The vibration-pressure machine has a rated capacity of 7 blocks per min. Pallet-oiler wheel and curing rooms are in the background.



Recognized Everywhere

The Hobbs Jr. Face-Down Block Machine is recognized everywhere as the great general purpose machine of the concrete-products industry. Famous for its wide range of sizes and the variety of blocks it can produce. As illustrated, it is equipped with striking and finishing device, shown under the floor-type tamper and with power feeder.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers and Jolterete, Stearns mixers, and Cast Iron and Press Steel pallets, Straublox oscillating attachments, etc. Repair parts for: Anchor, Ideal, Universal, Stearns, Blystone mixers and many others.

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PRODUCTION using one operator and one off bearer will average not less than six blocks per minute, or 2880 in eight hour day.

WRITE FOR INFORMATION this machine will amaze you in economy of performance and quality of product.

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The units are steam-cured in four tunnels, each 6 ft. wide, 6 ft. high and 28 ft. long. Racks are handled into and out of the curing rooms by two Barrett-Cravens lift trucks. The blocks remain in the curing chambers about 10 hr. before being moved into the yard and a recent test, made by the Toledo Testing Laboratory, on units 7 days after manufacture showed an average strength of 1,018 lb. Not only is this

View along yard ends of the curing rooms.

well in excess of requirements on any building job but the units tested showed remarkable uniformity, the lowest testing exactly 1,000 lb. and the highest 1,032 lb. According to Willis G. Porter, general manager, the units generally show 1,600-lb. strength or better after 28 days in the yard. Plain-faced units are now being manufactured almost exclusively, Mr. Porter having little difficulty in convincing the user or dealer of the superiority of this type of unit over the old rock face, not only from the standpoint of improved appearance when laid up but because of its lower cost. They have been selling for 12c. in recent months.

The company operates three semi-trailer units for making deliveries. One Ford and two Dodge tractors pull the trailers, each of which is of the straight platform body type, capable of transporting from 400 to 500 blocks per trip. The company also owns a few Norwalk vault molds and casts up a stock of concrete burial vaults at infrequent intervals.

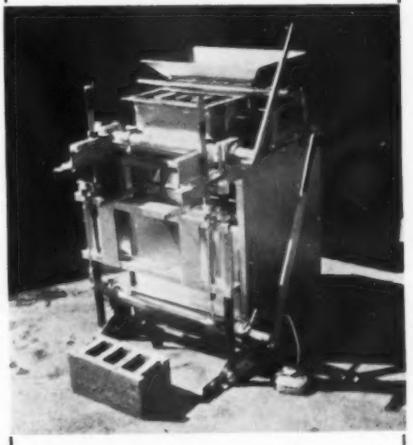
Recently some deviation from the high standard of blocks which the company customarily produces was noted. Unable immediately to put its finger on the source of the trouble, it received a visit from A. E. Hiscox, engineer of the Aetna Portland Cement Co. of Bay City, Mich. Mr. Hiscox, as part of the service offered cement users by his company, took a routine sample of the aggregate being used for analysis. After testing the material on standard laboratory sieves he was able to report that the proper amount of fines was lacking. This deficiency was quickly remedied and the trouble cleared up.

Unique State Marker

Quite often the change in type of pavement announces to the motorist the crossing of state boundaries, but the transition is usually also marked by some type of sign post or double-surfaced board indicating the line. The Texas Highway Department has gone beyond the simple form of marker with an elaborate and striking border marker, consisting of an outline of the Lone Star state, carved from locally produced stone, and mounted on a pedestal of stone masonry. The state outline, in itself ample identification, also carries across its face the word "Texas," deeply cut and colored black against the gray of the granite map.

ANNOUNCING the KIRKHAM

VIBRATOR



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The CONCRETE MANUFACTURER

By HARRY F. UTLEY

Detroit Concern Sets High Standard for Modern Concrete-Block Manufacture

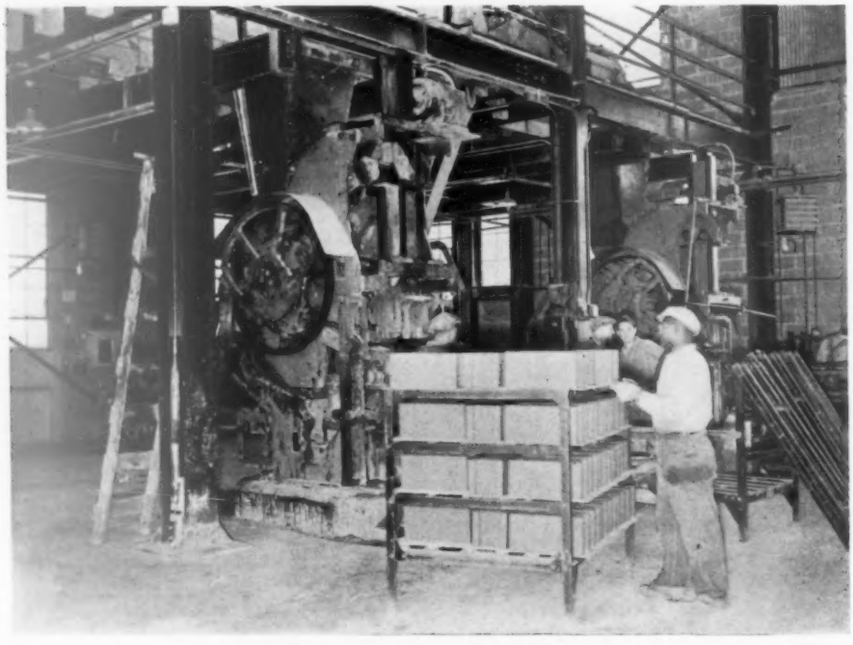
Covered storage and, in distance, new concrete-block plant of Currier Lumber Co., Detroit, Mich.

MECHANIZED, straight-line production methods, under-cover storage of cured units, and automatic batching by weight mark the modern concrete-products plant.

All these features are incorporated in the huge, new plant of the Currier Lumber Co. of Detroit, Mich., which went into operation in the spring of this year. Located on a site occupying approximately two city blocks near the corner of Schaefer and Joy Roads, the plant has been producing 15,000 standard 8-in. units, or equivalent, daily, giving it an estimated annual capacity of 4,500,000 blocks. Fewer men are probably employed to attain this output than in any other plant in the country due to the extensive use of mechanical handling of raw materials and finished products. Only two production machines are used, completely-automatic strippers, each with a rated capacity of 6½ blocks per min.

"More than a year ago our firm began experimenting with the possibility of making superior cement blocks in quantity," says Don Currier, vice-president of the company. "We finally decided to erect a plant where we could manufacture units of uniformly high quality and produce them in large enough quantities to give them adequate time for proper curing and seasoning. Scientific design of the plant and the installation of modern equipment enabled us to achieve this goal."

The output of the Currier plant is confined to gravel-concrete blocks. Aggregates are purchased from various commercial producers in specified combinations of fine and coarse materials. Railway facilities are at hand but the materials, including cement, are all being brought in by trucks for the present. Dump trucks bringing in aggregates discharge their loads over a grizzly into an underground hopper adjoining the plant. A 24-in. belt-conveyor on 10-ft. centers feeds the gravel to the boot of an inclosed bucket-elevator which has a vertical rise of 60 ft. Carried to the top of the plant, the aggregates are distributed to six steel hopper bins by a 24-in. belt-conveyor operating on 60-ft. centers. Plows located along the belt apportion the material to the six bins, each of which has a capacity of 60 cu. yd. The hoppers beneath these bins feed an automatic weigh-batcher equipped with Howe scales. Cement



The two automatic strippers, the combined output of which is 13 standard units per min.

Load of gravel being dumped through grizzly to receiving hopper.

is stored on the mixing floor, being received in cloth bags and carried upward by a special elevator, the arms of which cradle the bags and deposit them on a receiving platform on the mixing floor.

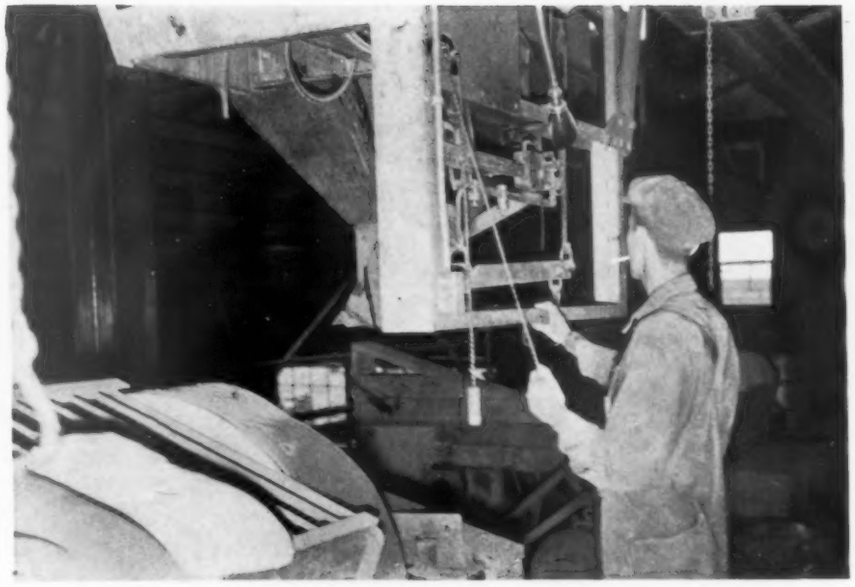
Two operators on the floor handle the batching of the aggregates and dump the cement into the two Besser 40-cu. ft. batch mixers equipped with twin spiral blades. The normal charge into each mixer is 3,100 lb. of aggregates and 3 bags of cement.

A view inside one of the six curing tunnels.

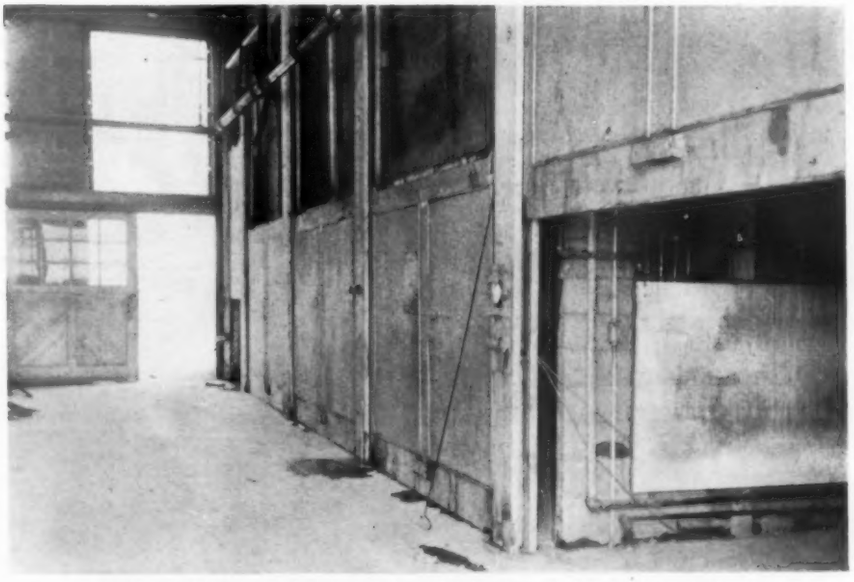
The two production machines are Besser K3 super strippers and are fully automatic, being equipped with automatic pallet feeders and automatic chain conveyors which carry the stripped units away from the machines to the off-bearers. The same plain pallets are used for all sizes of blocks. Full production was attained by the middle of April and the plant has been operating two shifts for a total of 19 hr. running time since, turning out 15,000 standard 8-in. block per day.

Discharge end of special elevator which handles sacked cement.

Three Lewis-Shepard jack-lifts are employed to run the racked blocks into six curing tunnels, the ends of which were placed as close as possible to the production machines. The floors of the

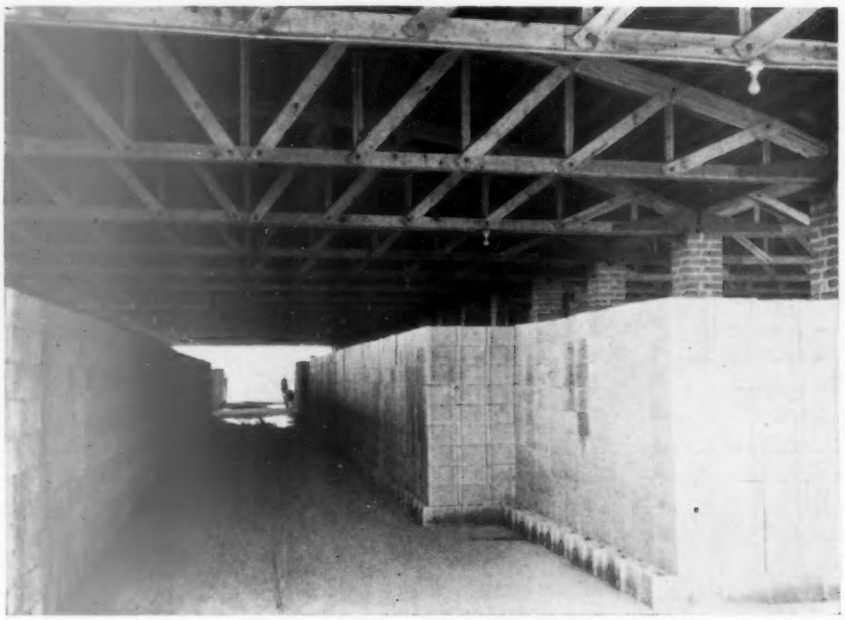


Operator at controls of aggregate batcher over the two 40-cu.ft. mixers.



View of four of the curing tunnels showing piping arrangement.

Mobile gasoline-electric hoist which transports blocks from curing rooms to covered storage.



View inside the undercover storage which has a capacity of about 1,000,000 blocks. As there are no walls around the structure, there is free circulation of air.

plant and the tunnels are of concrete, the tunnels being 70 ft. long, 10 ft. wide and 6 ft. high. Low-pressure steam provides heat and moisture for curing, special White Showers (Detroit, Mich.) fog nozzles for releasing the steam being located in pipe-lines near the floor. Steam is furnished by a Wickes boiler fired by an automatic stoker. The boiler also heats the building in winter, Modine individual units circulating the heat. Stoker-size coal is received by railway.

The concrete floors in the curing tunnels extend for some distance at the yard end, forming a paved apron, and a concrete roadway connects it with the covered storage yard. Handling the cured units to the undercover storage is speedily accomplished with a mobile gasoline-electric hoist equipped with a Ready Power unit which the operator rides.

The storage yard covers a space 120 ft. by 240 ft. The roof is supported by masonry piers and is made up of 40-ft. arched spans covered with corrugated metal. It is electrically lighted, floored with concrete and can store about 1,000,000 blocks under ideal conditions. Being protected from the elements, the units are prevented from taking on moisture in excess of specifications during rainy weather, they can not freeze together in winter, loading and handling are made easier, and the salability of the block is at the maximum since the units are always clean and dry. The Detroit building code requires that concrete block attain a strength of at least 700 lb. per sq. in. The units being produced at the Currier plant have averaged 993 lb. at 5 days when tested at the city laboratory.

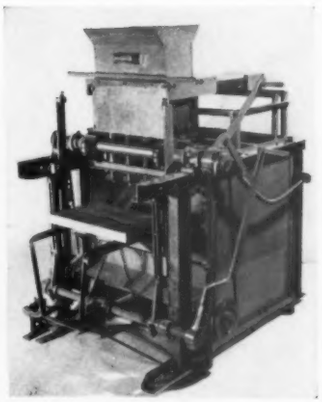
All the elevating, conveying and weighing equipment used in the plant was designed and built by Mechanical Handling Systems, Inc., of Detroit Reliance motors and Cleveland speed-reducers are used on this equipment.

The Currier Lumber Co. has for years been one of the leading building-supply dealers in Detroit and its environs. Its headquarters and mill are located at 17507 Van Dyke Ave., a west-side yard is operated at 14201 Tireman Ave., and another in suburban Royal Oak. At the new block plant a full line of lumber and building supplies will eventually be carried also, a 700-ft. long lumber-storage shed built of concrete block having already been erected.

Operations at the block plant are in charge of Harold A. Currier.

Automatic stoker and boiler which supplies steam for curing and for heating the plant.

The answer to low-cost profitable concrete block manufacture—the R & L Vibration Block Machine. Uses all aggregates with equal ease.



Uses only 1½ HP. Does not require special foundation. Can be set and operated anywhere. Uses either plain wood or steel pallets—one size for all block if you wish. Rapid, simple change for different sizes of all standard units.

Ridiculously low upkeep. No machine parts to wear out. High speed ball bearings. Simple, sturdy, dependable. Clutch operated with automatic brake action. Continuous operation calls for minimum physical effort.

Dense—uniformly packed block—of highest quality. Clean sharp edges and corners.

Easy on the pocketbook—but will enable any owner to compete profitably in any market.

R & L CONCRETE MACHINERY CO.
KENDALLVILLE, IND.
For more than 35 years makers of dependable concrete machinery

• Vibration Machine

A new low-cost, high-production concrete-block machine employing positive vibration to compact the concrete is a new development of the Concrete Transport Mixer Co., St. Louis, Mo.

Known as the Kirkham Vibrator, the machine is simple and sturdy and can be operated

Block machine employs positive vibration.

wherever light-socket power is available. It is of all-steel construction and makes all sizes of units with one size of plain pallet. Mold boxes are inexpensive and can be changed in one minute.

The machine weighs approximately 550 lb. and is said to work equally well with natural or lightweight aggregates. The vibrator is the only moving part and is fully inclosed, running in oil. Vibration is applied directly and positively to the concrete.

According to the manufacturer, the machine will make 1,000 standard 8-in. units or 8,000 bricks in 8 hr.

• Needle Bearing

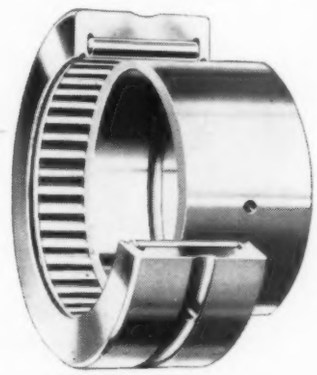
McGill Manufacturing Co., 1700 Lafayette St., Valparaiso, Ind., has announced a new design of full-type needle-roller bearing known as Solidend Multirol that is said to insure an increase in load-carrying capacity of as much as 12 per cent. over any previous design.

"Solidend" is intended to be descriptive of the new one-piece, inner-race construction by which rollers are race held without the use of loose-end washers and retaining-end rings. Roller-retaining shoulders are built integral with the outer race so that the possibility of accidentally bending or breaking the conventional end-washers resulting in dissembling the unit is eliminated.

Extra load-carrying capacity is accomplished by using full-length, rounded-end rollers instead of the usual trunnion or conical end, thereby increasing effective race and roller contact.

Lubrication is provided for through oil holes evenly spaced in oil grooves on both outer and inner races. In addition the roller-race surface is recessed or undercut where the roller starts to round as a storage space for lubricants.

A variety of size combinations that can be used with or without the separable inner races in shaft sizes up to five inches facilitates the application of these new bearings. Special and larger sizes to specifications are available.



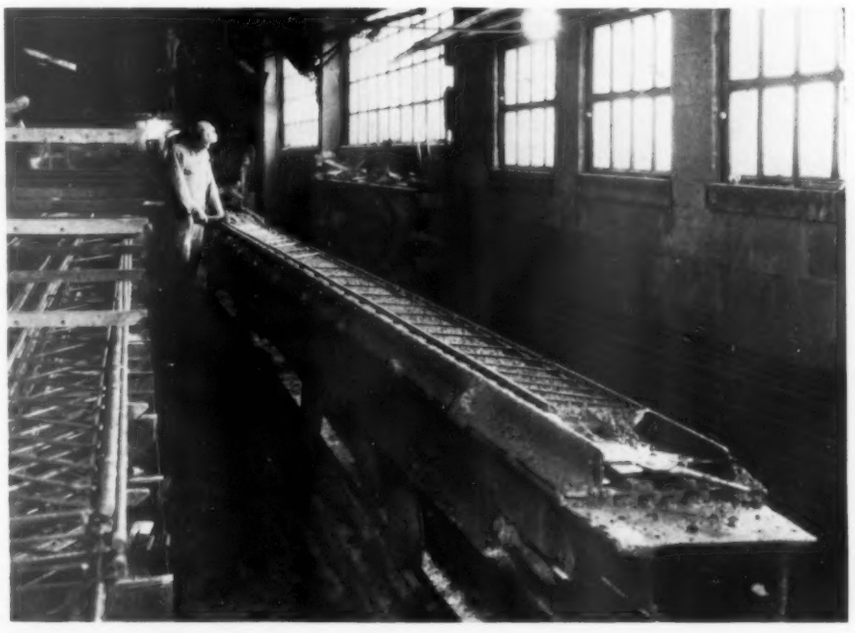
Needle-type roller bearing.

• Joist Machine

The Lith-I-Bar concrete joist machine, a new product of the Precast Unit Co., Kalamazoo, Mich., is of the rolling type. The steel pallet for the joist rests in a movable carriage which, when passing back through the machine, receives a half-charge from the hopper. An electric-welded reinforcing unit is then accurately placed in the form and as the carriage moves through the machine again the rest of the concrete is placed and the joist passes under a series of 1,000-lb. rollers which compacts the concrete and gives a smooth, dense product. The joist is then lifted from the machine and placed in a steam kiln for curing.

The Lith-I-Bar machine has a capacity of approximately 1,500 ft. of joist in 8 hours. It can be set for 8-in., 10-in., or 12-in. joists.

The ease and speed of production allows the use of this product on major projects such as the new men's dormitory, University of Michigan, at Ann Arbor, Mich., where over 100,000 ft. of Lith-I-Bar joists were used. The neat appearance of the joist has made the exposed joist type of ceiling common practice in many buildings.



Steel pallet rests on movable carriage in this joist machine.

• Brick Attachment

No matter what the character of construction, a few brick are required on every building job and concrete block manufacturers have long felt the need for some simple, low-cost equipment that could be used with their present production facilities for brick manufacture.

Stripper with brick-molding attachment.

Stearns Manufacturing Co., Adrian, Mich., announces a brick attachment for all Stearns power strippers and for all Stearns Clipper strippers that have lever operated or power operated strike-off.

The attachment consists of a mold box, tamp feet, hold-down assembly and compensating pallet support bars. The whole business is easily and quickly applied to the machine. It makes eight brick on end at each operation, trowelling all four sides of each. Uniform density is assured, as there's an individual tamp rod for each brick. Since brick are not cored units there is no objection to the use of plain wood or steel pallets.

The attachment is meeting with the favor of not only those plants having a demand for a few brick on each job but other plants operating in markets that absorb concrete brick in considerable volume.

The Marion Steam Shovel Co., Marion, O., has recently appointed J. F. Weis, formerly assistant electrical engineer, as special sales representative traveling out of the home office.

The CONCRETE MANUFACTURER

Your COMMUNITY WANTS A MAN

TO MANUFACTURE an improved building product of highest quality at lowest cost.

TO SUPPLY the entire building trade with more attractive and permanent construction that offers savings at every step. TO ESTABLISH new distribution methods whereby transportation and selling costs are reduced up to 25%.

YOUR COMMUNITY will welcome this man or firm to contribute materially to better buildings at lower cost. Your builders and prospective home owners are waiting for better, lower cost material which you will be able to supply.

If You Are the Man

WE WILL EQUIP YOU with exclusive line production machinery — Large production. Only one or two men. Equipment costs but fraction of other processes of equal capacity.

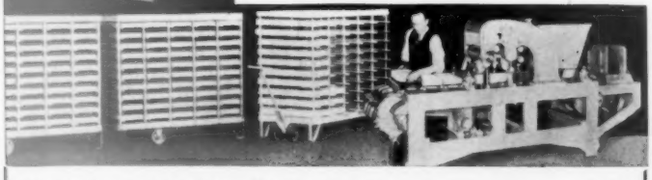
WE WILL SUPPLY YOU with processes to enable you to supply product in 40 colors, shades and textures. Your product will be capable of meeting all known building requirements and is now being used by Government-City Building Depts. throughout the country.

WE WILL GRANT YOU Manufacturing Franchise covering your locality — protecting your market, business and future, with available engineering and advertising service.

YOUR EARNING POWER AND FUTURE. Present manufacturers have pioneered the way for you. Some are selling at 100% over cost. Some are getting as high as 80% of the business in their territories.

YOUR OPPORTUNITY IS COMPLETE Ready made. One that is proven. Ready for you to cash in on the great building upturn under way.

YOU SHOULD INVESTIGATE while your territory is still open. Fill in and return coupon today. No obligation.



W. E. Dunn Mfg. Co., 420 W. 24th St., Holland, Michigan 7-39

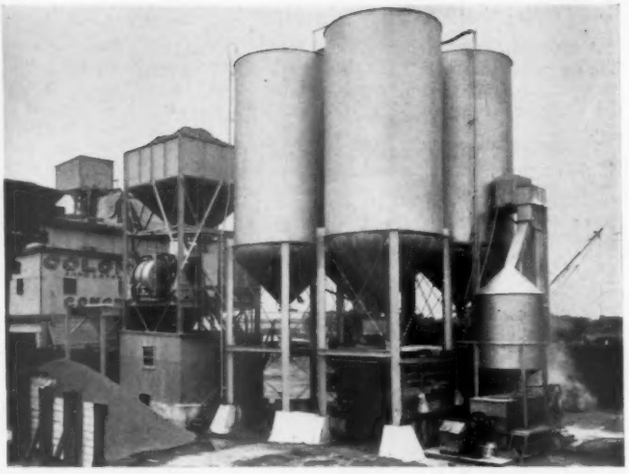
☐ Show me through your new books the earning power of an exclusive plant using surplus aggregate, and how I may WIN MANUFACTURING INDEPENDENCE.

☐ How a contractor can BUILD BETTER BUILDINGS FOR LESS.

Name .....

Address .....

City ..... State .....



Colonial increases capacity of its Brooks-Taylor Lime Putty Plant

The Colonial Sand and Stone Co. has installed two more ageing tanks at this Brooks-Taylor Lime Putty Plant to take care of increased demands for aged lime putty used in plastering, stucco and ready-mixed lime mortar. Write for information on a standard plant to supply your customers.

CHICAGO BRIDGE & IRON COMPANY

Chicago	2451 Old Colony Bldg.	Tulsa	1648 Hunt Bldg.
New York	3389—165 Broadway Bldg.	Birmingham	1503 North Fiftieth St.
Cleveland	2264 Rockefeller Bldg.	Dallas	1486 Liberty Bank Bldg.
Philadelphia	1645—1700 Walnut St.	Detroit	1552 Lafayette Bldg.
Boston	1550 Consolidated Gas Bldg.	San Francisco	1092 Rialto Bldg.
Houston	2919 Main Street	Los Angeles	1457 Wm. Fox Bldg

Plants at BIRMINGHAM, CHICAGO & GREENVILLE, PA.

NEW Sewer and Culvert Construction

By making concrete pipe on the job with Quinn Forms you give more men more work, can use less experienced labor and produce uniform concrete pipe of highest quality. Recognized standard of all concrete pipe.

QUINN PIPE FORMS

Quinn Heavy Duty and Medium Duty Pipe Forms best for hand or wet process pipe. Give more years of service. All diameters—12 to 84 inches. Tongue and groove or bell end pipe, any length.

WRITE for New Book on Concrete Pipe giving information and prices, valuable tables on production costs, strength tests, Pipe Forms, Pipe Machines, etc. Book sent free.

QUINN WIRE & IRON WORKS 1627 12 St. Boone, Iowa

Heltzel BUILDS IT BETTER

HELTZEL Portable 2 Compartment Trailer Bin. 80 tons capacity. Indispensable for material yards. Can be moved —in upright position.

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO, U.S.A

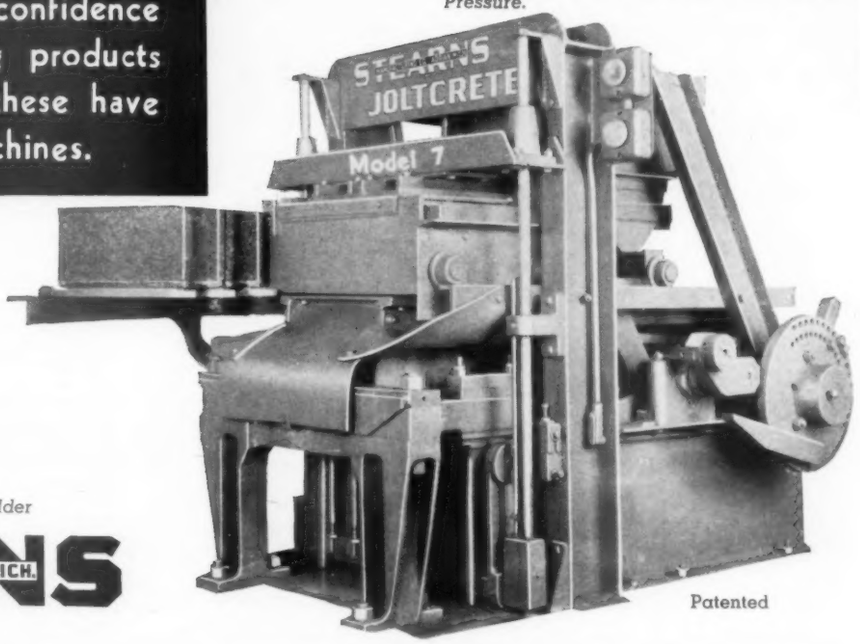
STEARNS JOLTCRETE

has been bought with confidence by 55 forward looking products manufacturers. Six of these have ordered their second machines.

The CONCRETE MANUFACTURER

Pioneers

Stearns Joltcrete is the result of seven years of experimental and three of successful commercial operation. Many exclusive patented features, including *Limited Amplitude Vibration* and *Vibration Under Pressure.*



Patented

Here's No. 7

Operates exactly like the original Stearns Joltcrete No. 9—makes two 8x8x16" blocks per cycle, 3½ cycles per minute. It's hard to compete against Stearns Joltcrete blocks!

Write for the New Stearns Joltcrete Folder

STEARNS MANUFACTURING CO. - ADRIAN, MICH.

GENE OLSEN, PRESIDENT

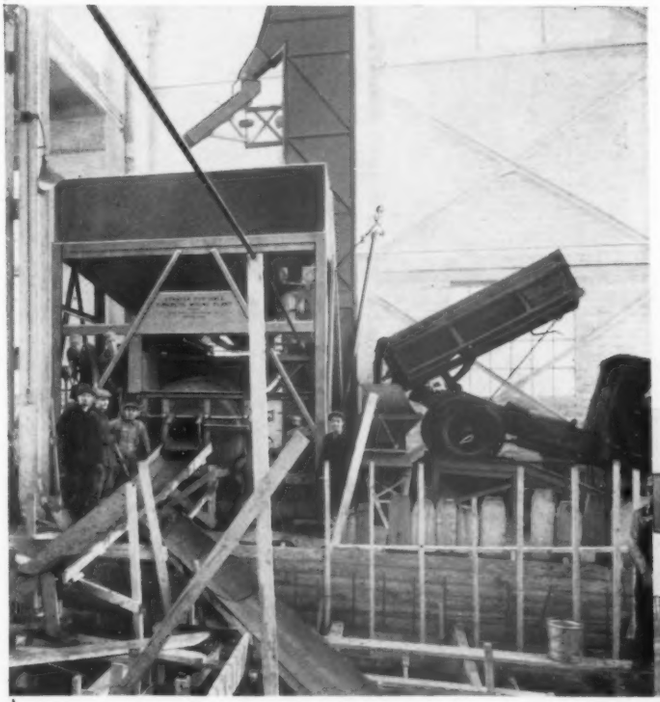
STRAYER PORTABLE CONCRETE PLANT

Produces Low-Cost Concrete

A fully portable, completely equipped, Concrete Mixing Plant. Loads its own sand and gravel, batches these materials, and mixes concrete right on the job. Cement is fed into mixer by a power-driven screw conveyor—positive in action.

Plant does not require stock piles, crane, batch trucks, transit mixers, skip, or other usual concrete equipment. It is a complete plant within itself.

Saves investment, waste and labor. One man operated, exclusive of cement labor. Makes any specification concrete. Approved by Engineers, Architects and Contractors. Write for further information.



Working On Industrial Job

Plant in Transit

ERIE STEEL CONSTRUCTION COMPANY

Box 1031-P, Erie, Pennsylvania

"COMMERCIAL" CORED *Steel* PALLETS

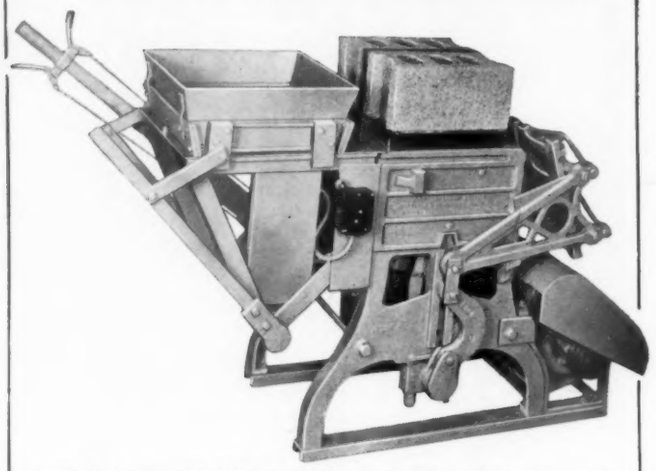
Have many advantages over wood, cast iron and plain steel.

We will tell you what they are—a letter is cheaper than advertising space and there are many reasons why you should buy Commercial Cored Steel Pallets.

COMMERCIAL PALLETS FOR ECONOMICAL EQUIPMENT AND PRODUCTION

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

This Time Tested Unit Now Available *with Vibration*



This is the Multiplex Model C Double Stripper with the new variable speed vibrator attached. Vibrates while filling, and pressure is applied to finish top of block.

Makes plain and face block in all sizes from 3" to 12" in width, with press-top finish.

Investigate this new unit.

THE MULTIPLEX CONCRETE MACHINERY COMPANY
ELMORE OHIO

Blaw-Knox is the only manufacturer offering complete equipment for ready mixed concrete; including Trukmixers and Agitators, Ready Mixed Concrete Plants and Truck Mixer Loading Plants of all capacities and types.

Send for Blaw-Knox Catalogs Nos. 1566 and 1582.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PA.

BLAW-KNOX *Truck Mixer* LOADING PLANTS

FAST WATER!

"MAN... That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."

The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.

Send for BLAW-KNOX Catalog 1582

26

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and TRUKMIXERS

CONCRETE PRODUCTS MANUFACTURERS

Write For

Your Copy of This Folder

21 ADVANTAGES for YOU

Everyone Interested in the Manufacture of Concrete Products Should Read It—

ASK FOR "FOLDER 21"

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND.

507 39th St. « « « ALPENA, MICHIGAN

They're Buying Jaegers because

JAEGER ALONE Builds This MODERN TRUCK MIXER....

SYPHO-METER WATER TANK

Accurate within a fractional per cent of tank capacity **regardless of tank position or splashing on roughest roads**—a 1939 improvement. 1.

DUAL REVOLVING WATER SPRAYS

100% faster, uniform water distribution—clear path as they revolve, spray ***into and over mass in both directions, from end to end of drum*** —insure thoro mix even on shortest hauls—a 1939 improvement. 2.

MORE SALABLE CONCRETE

Jaeger Reversing End-to-End Mix, plus accurate measurement and more rapid and uniform distribution of water, produce recognized higher strength concrete, give Jaeger operators a basic sales advantage. Bulletin TM-39 gives up-to-the-minute information. Send for your copy. 3.

THE JAEGER MACHINE COMPANY

602 Dublin Ave. Columbus, Ohio

The CONCRETE MANUFACTURER

Stepping Ahead .. in TRUCK MIXER DESIGN

Old style, hatch-loading Smith Truck Mixer — predecessor of the SMITH-MOBILE.

New model SMITH-MOBILE — 4 yard size as a truck mixer; 6 yard size as an agitator.

Exclusive SMITH-MOBILE FEATURES

HIGH DISCHARGE — permits steeper and longer distributing spout. Discharges into high forms. No hoist or ramp required.

CONTROLLED DISCHARGE — Pour it fast or slow, concrete will not segregate.

FEED CHUTE — Fast charging. No troublesome, leaky hatch to open or close. Easy to spot under bin.

WATER—introduced through feed opening. No clogged water bells buried in concrete.

BETTER MIXING—Fast, thorough "end-to-end" movement of aggregates.

MIXES WHILE CHARGING — Drum rotates during charging operation. Mixing and shrinking of batch start instantly.

VISIBLE MIXING — Sealing door can be opened wide during mixing cycle. You can SEE what's going on.

FOR YEARS, truck mixer operators have been trying to get away from leaky and tiresome loading hatches, troublesome rear discharge doors, clogging water bells and inefficient low discharge. Now, the modern SMITH-MOBILE eliminates these disadvantages and includes many exclusive, time-tested features that make for more efficient and convenient operation. Available as truck mixer in four sizes: 1½, 2, 3 and 4 yds.; as agitator, 2, 3, 4½ and 6 yds. Built and guaranteed by SMITH — concrete mixer manufacturers for more than 40 years. Why not get the complete SMITH-MOBILE story? Write for literature.

THE T. L. SMITH COMPANY
2887 N. 32nd STREET **MILWAUKEE, WIS.**

SMITH-MOBILE
THE *Modern* TRUCK MIXER and AGITATOR

WHAT'S THE DIAMETER OF THAT SHEAVE?

FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

If there ever was a man who knows how to use wire rope, it's the superintendent here. This AM I asked him what his secret is.

"Just good horse sense," he says. "Take sheaves, for instance. The larger the sheave, the longer the rope will last. Anybody knows that. So I always use the size recommended in your handbook. What's the percentage of saving a few cents on a sheave if it cuts down on the life of the rope?"

He's right. A lot of people using wire rope today would save themselves a pile of grief if they'd just ask first, "What's the diameter of that sheave?"

Yours,

al

TO get the most satisfactory rope life on your equipment, use large sheaves. Undersize sheaves cause high bending stresses which in turn cause wire failures of the square off type (fatigue breaks) to occur.

Another result of small sheaves is accelerated wear. Pressure of a rope on a sheave is inversely proportional to the sheave size. If the sheave is too small, this excessive pressure will cause both rope and sheave groove to wear out rapidly. Small sheaves also reduce rope strength, because the individual strands and wires cannot adjust themselves properly to an unduly sharp bend.

That's why it's vitally important to use sheaves that are of adequate diameter. In general, follow this table. In case of question, our engineers will be glad to consult with you.

WIRE ROPE	SHEAVE FACTOR Recommended*	Minimum*
6 x 7	72	42
18 x 7	51	34
6 x 19	45	30
6 x 21	45	30
6 x 25	45	30
6 x 30	45	30
8 x 19	31	21
6 x 37	27	18
5 x 19	27	18

*times rope diameter

USS

EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Readers and Advertisers Alike Prefer PIT AND QUARRY

For nearly a decade Pit and Quarry has led the field in subscriptions among producers. Its popularity has grown constantly, its margin of lead increased steadily, not by any sudden bound due to special offers or inducements. Its volume of advertising in 1938 was definitely larger than that of any other paper in the field.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked with them. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working with them.

The subscription price is still only one dollar for a full year's service. If you are not already a subscriber, why not send in a dollar and learn why other producers find Pit and Quarry so valuable? The cost is small—the results so large—don't delay.

Return This Coupon To-day—Start Your Subscription with the July issue

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for.....
1 year ($1.00) .....starting with the July issue. (Foreign add $1.00 per year.)

My Name..... Title.....

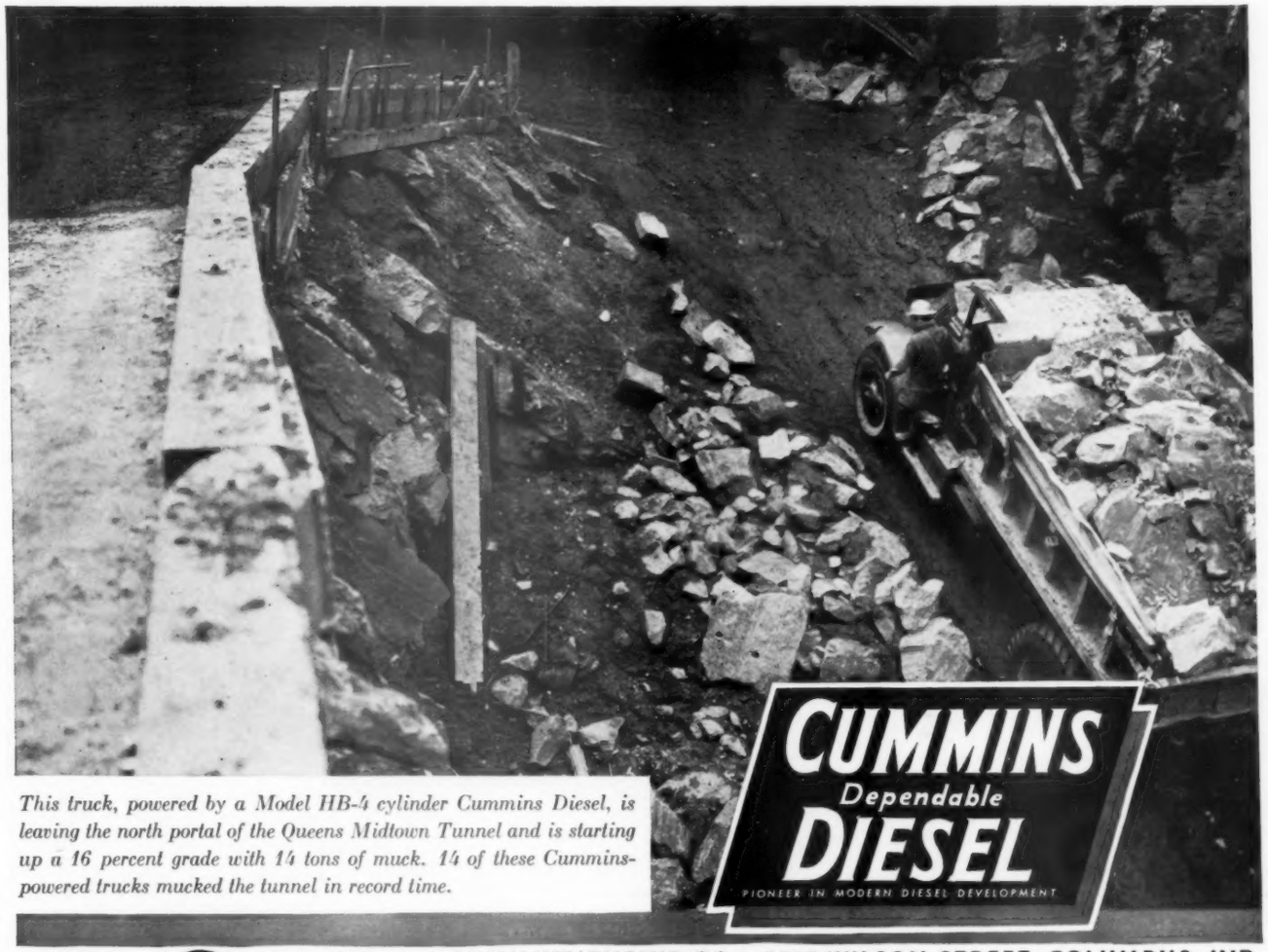
Company Name .....

Send to (Address).....

We Produce.....

first internal combustion engines ALLOWED ON TUNNEL WORK

Because the exhaust proved to be free of poisonous carbon monoxide . . . the New York City Tunnel Authority and the State Dept. of Labor gave the Woodcrest Constr. Co., and Rosoff Bros., Inc., permission to use Cummins Diesel-powered trucks in the Queens Midtown Tunnel. This was the *first time* any internal combustion engine had been allowed in New York tunnel construction jobs. Cummins Diesels speeded up the job by saving an extra handling of the muck—by coming up out of the tunnel faster. In addition, Cummins dependability assured the contractor he would finish the job on time. We have prepared a bulletin giving the whole story. We'd be glad to send it to you FREE. Use the coupon. Cummins Engine Co., 3816 Wilson Street, Columbus, Indiana.



This truck, powered by a Model HB-4 cylinder Cummins Diesel, is leaving the north portal of the Queens Midtown Tunnel and is starting up a 16 percent grade with 14 tons of muck. 14 of these Cummins-powered trucks mucked the tunnel in record time.

Free Bulletins for Contractors or Engineers

CUMMINS ENGINE CO., 3816 WILSON STREET, COLUMBUS, IND.

Please send me:

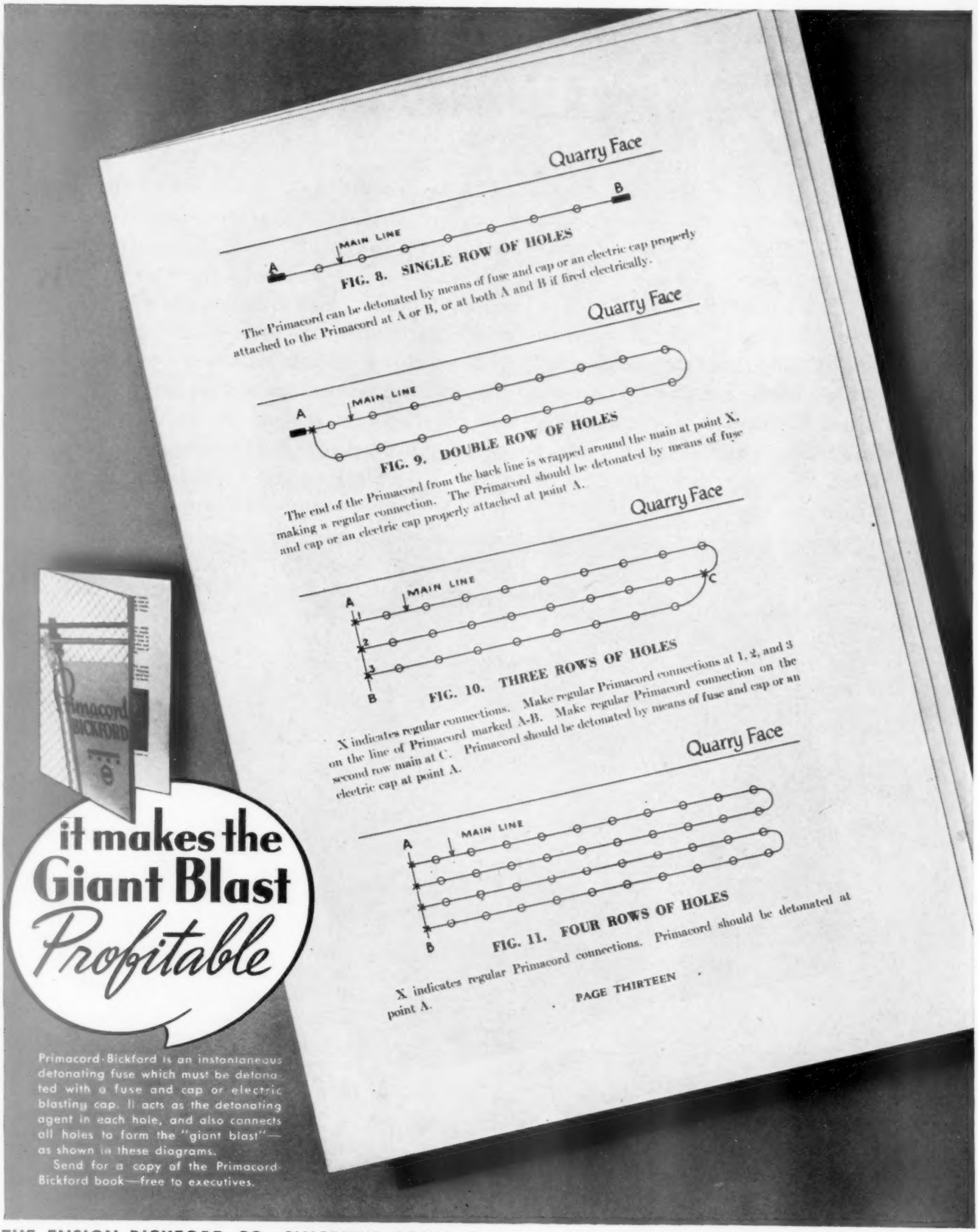
☐ Analysis of Diesel Exhaust

☐ Cummins Diesels in New York's Queens Midtown Tunnel

Name ..... *Position* .....

Address .....

City ..... *State* .....

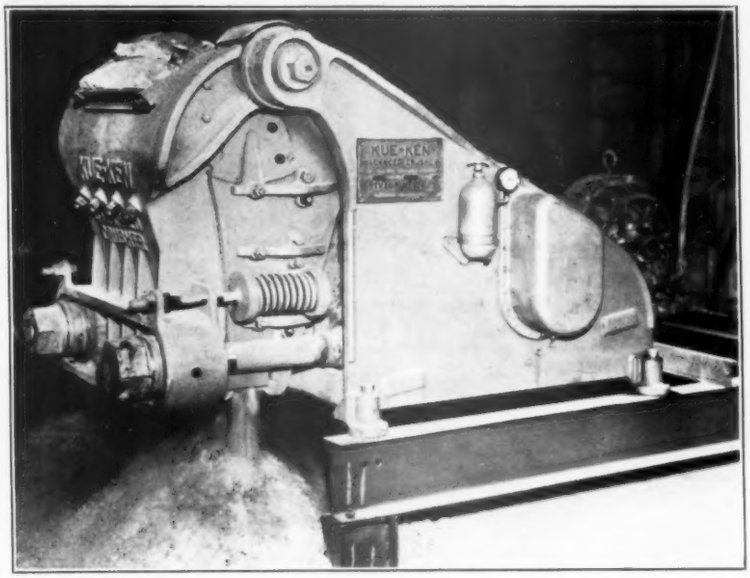

Quarry Face
MAIN LINE
A
B
FIG. 8. SINGLE ROW OF HOLES
The Primacord can be detonated by means of fuse and cap or an electric cap properly attached to the Primacord at A or B, or at both A and B if fired electrically.
Quarry Face
MAIN LINE
A
FIG. 9. DOUBLE ROW OF HOLES
The end of the Primacord from the back line is wrapped around the main at point X, making a regular connection. The Primacord should be detonated by means of fuse and cap or an electric cap properly attached at point A.
Quarry Face
MAIN LINE
A
1
2
3
B
C
FIG. 10. THREE ROWS OF HOLES
X indicates regular connections. Make regular Primacord connections at 1, 2, and 3 on the line of Primacord marked A-B. Make regular Primacord connection on the second row main at C. Primacord should be detonated by means of fuse and cap or an electric cap at point A.
Quarry Face
MAIN LINE
A
B
FIG. 11. FOUR ROWS OF HOLES
X indicates regular Primacord connections. Primacord should be detonated at point A.
PAGE THIRTEEN
it makes the
Giant Blast
Profitable
Primacord-Bickford is an instantaneous detonating fuse which must be detonated with a fuse and cap or electric blasting cap. It acts as the detonating agent in each hole, and also connects all holes to form the "giant blast"—as shown in these diagrams.
Send for a copy of the Primacord-Bickford book—free to executives.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN., U. S. A. *Makers of Ensign-Bickford Safety Fuse since 1836*

PRIMACORD-BICKFORD *Detonating Fuse*

PB 10

TRY THIS ON YOUR CRUSHER



This No. 50 KUE-KEN on one job is crushing 50% more than a gyratory weighing over three times as much set at 1½" compared to ⅝" jaw setting for the KUE-KEN. With ⅝" jaw setting the KUE-KEN crushes 30 tons per hour to 95% minus 1". The best the previous crusher could do was 20 tons per hour with 1½" jaw setting. Over 50% of this was oversize and had to be recrushed.

Take a crusher weighing only 11,000 pounds.
Take a 40 HP motor.
Use plain smooth jaws set at ⅝".
Feed extremely hard river gravel, 2 to 6 inch size.

With a choke feed, try and put 30 tons per hour through with 95% minus 1".

You will find that you can't do it with an ordinary crusher.

It can be done and is BEING done with a KUE-KEN balanced crusher.

One operator has replaced a well-known gyratory type crusher weighing over three times as much with a No. 50 KUE-KEN crusher. He says "with the gyratory I could never set it closer than 1½"." The capacity was only 20 tons per hour and over 50% of the product was oversize and had to be returned for re-crushing.

Write Today For Bulletin 600.

STRAUB MFG. CO.

528 CHESTNUT STREET
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Sterling **QUARRY TRUCKS—BUILT FOR QUARRY WORK**

Performance, Economy, Dependability, and Sturdiness constitute the foundation upon which Sterling has built its reputation as a superior motor truck. Sterling motor trucks have been adopted by leading contractors everywhere who demand unfaltering service, large payloads, and low operating costs. Because Sterlings are built to meet your operating conditions, you are assured long, dependable service and greater profits.

Write for Literature descriptive of quality chassis built to meet your operating requirements.

STERLING MOTORS CORPORATION
MILWAUKEE, WIS.
Factory Branches in Principal Cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Manitowoc Engineering Works
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

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*Research Corp.
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*Link-Belt Co.
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SKF Industries, Inc.
Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Ball)
SKF Industries, Inc.

Bearings (Roller)
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Belt Fasteners
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Belt Lacing
Flexible Steel Lacing Co.

Belting
*Cincinnati Rubber Mfg. Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Manhattan Rubber Mfg. Div.
Quaker City Rubber Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Belts (Fan)
Quaker City Rubber Co.

Belts (Multiple-V)
Manhattan Rubber Mfg. Div.

Bin-Dicator
Bin-Dicator Co.

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*Fuller Company
*Haiss Mfg. Co., Geo.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
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*Jeffrey Mfg. Co.
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McCarter Iron Works, Inc., The
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*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bins (Steel)
*Austin-Western Road Machy. Co.
*Blaw-Knox Co.
*Chicago Bridge & Iron Co.
*Diamond Iron Works
*Erie Steel Constr. Co.
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*Hendrick Mfg. Co.
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*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Link-Belt Co.
Louisville Drying Machy. Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Bit Grinders
Gardner-Denver Co.

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Blasting Machines
Atlas Powder Co.
National Powder Co.

Blasting Supplies
Atlas Powder Co.
*Ensign-Bickford Co.
National Powder Co.

Block Machines (Concrete)
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Block Machines (Power Press, Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Blocks (Sheave)
*Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
Sprout, Waldron & Co.

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*Northern Blower Co.
*Sly Mfg. Co., W. W.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Concrete Transport Mixer Co.
Jaeger Machine Co.
*Smith Co., T. L.

Bodies (Dump Truck)
Commercial Shearing & Stamping Co.
*Easton Car & Construction Co.

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Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

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*General Electric Co.

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Dunn Mfg. Co., W. E.
*R and L Concrete Machy. Co.
*Stearns Mfg. Co.

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*Stearns Mfg. Co.

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*Tyler Co., W. S.

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Buckets (Asphalt)
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*Blaw-Knox Co.
*Erie Steel Constr. Co.
Frog, Switch & Mfg. Co.
*Haiss Mfg. Co., Geo.
Industrial Brownhoist Corp.
*Link-Belt Co.
Owen Bucket Co.

Buckets (Dragline—Cableway)
*Bucyrus-Erie Co.
*Erie Steel Constr. Co.
*Link-Belt Co.
Page Engineering Co.
*Sauerman Bros., Inc.

Buckets (Dump)
*Brooks Equip. & Mfg. Co.
*Dempster Bros. Inc.
*Jaeger Machine Co.

Buckets (Elec. Heated, Weighing)
*Easton Car & Construction Co.
McCarter Iron Works, Inc., The

Buckets (Elevator and Conveyor)
*Chicago Steel Fdry. Co.
Cross Engineering Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Industrial Brownhoist Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Buggies (Dump)
*Koehring Co.
*Le Tourneau, Inc., R. G.

Bulk-Cement Storage Plants
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.

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*Le Tourneau, Inc., R. G.

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Cable (Electric)
*General Electric Co.

Cableways
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Bethlehem Steel Co.
Page Engineering Co.
*Roebling's Sons Co., John A.
*Sauerman Bros., inc.

Capacitors
*General Electric Co.

Caps (Blasting)
Atlas Powder Co.
National Powder Co.

Caps (Blasting, Electric)
Atlas Powder Co.
National Powder Co.

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*General Electric Co.

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*Link-Belt Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

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*Austin-Western Road Machy. Co.
*Koehring Co.
*Le Tourneau, Inc., R. G.

Cars (Block, Concrete)
*Link Belt Co.
*Multiplex Concrete Machinery Co.

Cars (Industrial)
*Easton Car & Construction Co.

Cars (Quarry & Gravel Pit)
*Austin-Western Road Machy. Co.

Castings
Alloy Steel & Metals Co.
Chicago Steel Fdry. Co.
*Eagle Iron Works
Frog, Switch & Mfg. Co.
*Hardinge Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Link-Belt Co.
McLanahan & Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

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Central Concrete Mixing Plants (Comp.)
*Erie Steel Constr. Co.
Heltzel Steel Form & Iron Co.
*Jaeger Machine Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
Cross Engineering Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

Chute Lining (Rubber)
Manhattan Rubber Mfg. Div.

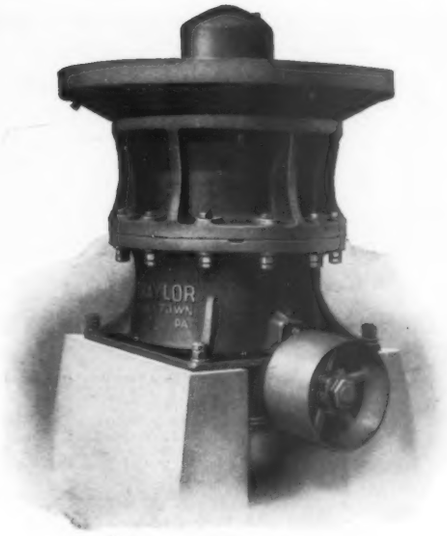
Chutes and Chute Liners
Cross Engineering Co.
Frog, Switch & Mfg. Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Circuit Breakers and Testers
*General Electric Co.

Classifiers
*Deister Machine Co.
*Hardinge Co.
Kennedy Van Saun Mfg. & Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Simplicity Engineering Co.
Straub Mfg. Co.

Clips (Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.
*Roebling's Sons Co., John A.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.



Our Type H Jaw Crusher is the lightest, strongest and most efficient Blake type crusher ever built. See our Bulletin 1105.

every user is a booster for the*

TRAYLOR
TY REDUCTION CRUSHER

It is not necessary to "ask the man who owns" a Traylor TY—he's only too ready to "tell the world" what a big money maker he's found it to be.

We wish you could hear some of these stories and read the enthusiastic letters we receive about the TY—but, after all, the convincing thing to do is to USE one.

Why don't you modernize your fine crushing with a TY—the only crusher that will do the job efficiently and profitably?

Investigate this machine. The full story is told in our Bulletin 2112. Yours for the asking!

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SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SEATTLE 6311 22nd Ave., N. E.
THE CANADIAN FAIRBANKS-MORSE CO., LTD. 980 St. Antoine St., Montreal, P. Q., Canada
B. C. EQUIPMENT CO., LTD. Vancouver, B. C., Canada
MAQUINARIA INTERNACIONAL, S. R. L. Av. Francisco I. Madero No. 17 Desp. 214, Mexico, D. F., Mexico
MANILA MACH. & SUPPLY CO., INC. Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City.

Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Autofagasta, Oruro

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INDUSTRIAL BROWNHOIST *Buckets*

ROPE-REEVE
POWER-WHEEL
LEVER-ARM
LINK-TYPE

stand-up on tough jobs . . .

Tough handling jobs merely prove the better construction of Industrial Brownhoist Clamshells. They stay on the job in spite of all kinds of punishment and emphasize the importance of our forty years experience in the design and building of buckets that boost production and reduce costs.

Would you like to have complete information on Industrial Brownhoist Buckets? Booklets 353 describes the complete line—½ to 15 yards capacity. Send for a copy.

INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN
District Offices: New York, Philadelphia, Pittsburgh, Cleveland, Chicago

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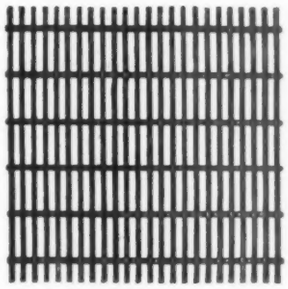


Rolled Slot

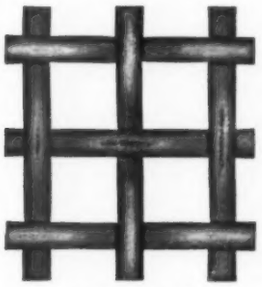
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

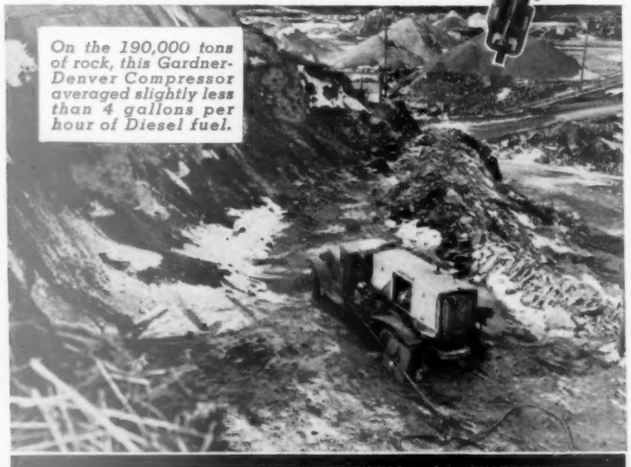
MOVING 190,000 TONS OF ROCK

at a Saving of $2,850.00 with this GARDNER-DENVER Equipment

This Gardner-Denver 315 WBG Diesel Portable Compressor, operating three Gardner-Denver S-55 Sinking Drills, has been working constantly for the past three years . . . moving 190,000 tons of rock. The contractor's own figures show that the operation of the portable compressor has cost only 6/10 cent per ton of rock. Before the purchase of this Gardner-Denver compressor, a gasoline engine driven unit had been used, and the cost with this outfit was 2c per ton. The Gardner-Denver equipment thus saves 1½c on every ton of rock—a total saving to date of $2,850.00—with plenty of future savings to come. During the entire period of operation—a total of 3,353 working hours—the Gardner-Denver Portable Compressor has cost only $10.00 for repairs.

The way to save money—and to increase output—on rock work is to use Gardner-Denver Portable Compressors and Gardner-Denver Drills. Change to this profit-building equipment—and let PERFORMANCE tell the story for *you!* Gardner-Denver Co., Quincy, Ill.

Gardner-Denver S-55 Sinkers—leaders in their weight class—provide top-notch drill performance.



GARDNER-DENVER

80th ANNIVERSARY YEAR

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Jeffrey Mfg. Co.
*Link-Belt Co.
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*Fuller Company
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Straub Mfg. Co.

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*Jaeger Machine Co.
*Jeffrey Mfg. Co.
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*Robins Conveying Belt Co.

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*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

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*Smidth & Co., F. L.

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Sprout, Waldron & Co.

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*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
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*Koehring Co.
*Lima Loco. Works
*Link-Belt Co.
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

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*Erie Steel Construction Co.

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Industrial Brownhoist Corp.
*Erie Steel Construction Co.

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*American Pulverizer Co.
Frog, Switch & Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.

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*Nordberg Mfg. Co.

Crushers (Hammer)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
*Dixie Machy. Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
Alloy Steel & Metals Co.
*Austin-Western Road Machy. Co.
Bacon, Inc., Earle C.
*Diamond Iron Works
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
Lewistown Foundry & Machine Co.
*McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.

Crushers (Ring)
*American Pulverizer Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
*Diamond Iron Works
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Straub Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

*See also detail informationin the 1939 Pit and Quarry HANDBOOK.

Crushing Rolls
Alloy Steel & Metals Co.
*Austin-Western Road Machy. Co.
Frog, Switch & Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Straub Mfg. Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutter Heads (Dredging)
*Eagle Iron Works

Detonators
Atlas Powder Co.
National Powder Co.

Diaphragms (Rubber)
Quaker City Rubber Co.

Diesel Engines (See Engines—Diesel)

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Frog, Switch & Mfg. Co.

Dippers and Teeth (Power Shovel)
*Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
*Koehring Co.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
*Link-Belt Co.
Page Engineering Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Erie Steel Constr. Co.
Industrial Brownhoist Corp.
*Koehring Co.
*Lima Loco. Works
*Link-Belt Co
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engineering Co.
Page Engineering Co.
Thew Shovel Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Driers
*Chicago Bridge & Iron Co.
*Hardinge Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
Lewistown Fdry. & Machine
*Link-Belt Co.
Louisville Drying Machy. Co.
McCarter Iron Works, Inc., The
McLanahan & Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bit Sharpeners
Alloy Steel & Metals Co.

Drill Bits
*Bucyrus-Erie Co.

Drill Sharpening Machinery
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drilling Accessories
*Bucyrus-Erie Co.
Gardner-Denver Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.
Gardner-Denver Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Drifting)
Gardner-Denver Co.

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Gardner-Denver Co.

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*Jeffrey Mfg. Co.

Drills (Sinking)
Gardner-Denver Co.

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Gardner-Denver Co.

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*Bucyrus-Erie Co.
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*Bucyrus-Erie Co.

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Drives (Multiple Belt, Chain, Rope)
*Link-Belt Co.

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Gillette Kiln Sales

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*Blaw-Knox Co.
*Buell Engineering Co.
*Northern Blower Co.
*Parsons Engineering Corp.
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
*Blaw-Knox Co.
*Buell Engineering Co.
McCarter Iron Works, Inc., The
*Northern Blower Co.
*Parsons Engineering Corp.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
*Blaw-Knox Co.
*Buell Engineering Co.
*Fuller Company
*Parsons Engineering Corp.
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Filters
*Buell Engineering Co.
*Parsons Engineering Corp.
*Research Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

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*General Electric Co.

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*General Electric Co.

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Wall-Colmonoy Corp.

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Cross Engineering Co.
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*Traylor Engr. & Mfg. Co.

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Cummins Engine Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Page Engineering Co.
Superior Diesel Engine Division of the National Supply Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
Cummins Engine Co.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Page Engineering Co.
Superior Diesel Engine Division of the National Supply Co.

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*Morris Machine Works
*Nordberg Mfg. Co.

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Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
Atlas Powder Co.
National Powder Co.

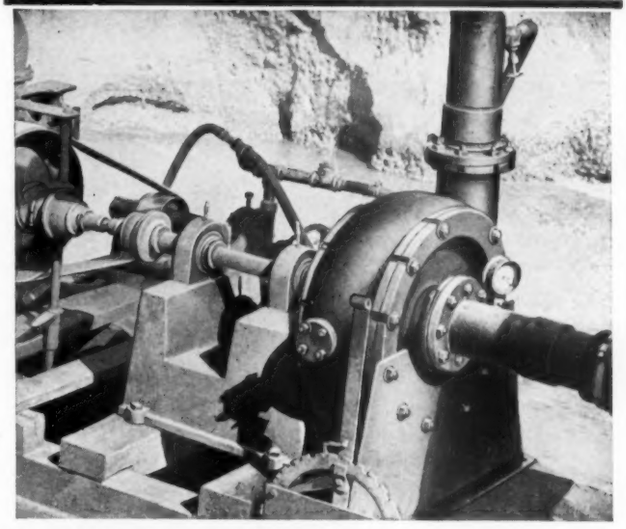
Fans
*General Electric Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Northern Blower Co.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



Proof that a sand pump can be both simple and durable . . .

Two years ago a representative sand and gravel plant bought a Morris Type K Sand Pump—which is our simplest design, having only four wearing parts. We have just received a report from the owners, as follows: "Took your pump apart this Winter for inspection after two years of operation without repairs, and find it did not show any appreciable wear." For description of this low-cost, long-wearing sand pump, write for Bulletin 174.

A testimonial backed by a re-order . . .

When an inquirer (not a Morris representative) recently asked a Morris dredge user for an opinion as to performance, the answer was . . . "We find our Morris Dredge costs less to operate than any other make we ever had. In fact, we like it so well that we have just bought another one." It will pay you to investigate the dredge and dredge pump designs that earn comments of this kind. You can do so by writing for Morris Dredge and Dredging Pump Bulletins.

MEMBER

For authoritative recommendations on any pumping or dredging problem, write Morris Machine Works, Baldwinsville, N. Y. Export Office: 30 Church St., New York, N. Y.

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*Hardinge Co.

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*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

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*General Electric Co.
*Lima Loco. Works.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

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Davenport Loco. Works
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

Locomotives (Oil-Electric)
Davenport Loco. Works
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

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Davenport Loco. Works
*General Electric Co.

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Manganese Steel Forge Co.

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*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy Van Saun Mfg. & Eng. Corp.
*Smidth & Co., F. L.
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*Traylor Engr. & Mfg. Co.

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*Brooks Equip. & Mfg. Co.
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*Kent Machine Co.
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*See also detail information in the 1939 Pit and Quarry HANDBOOK.

Announcing . . . the New 300 L. F. LOAD FORWARD

DEMPSTER DUMPSTER

Handling—3 cu. yd. (Water Level)

Detachable—Drop-Bottom—Bodies

This efficient unit is for mounting on truck chassis of 2-3 ton rated capacity.

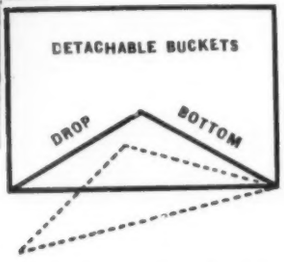
Loading and Handling Costs are reduced to a New Low and no operation can afford to be without one or more DEMPSTER-DUMPSTERS.

Wire or write for details on all sizes.

No Overhang

No Sidesway

No Counter-weight



DEMPSTER BROS. INC. KNOXVILLE, TENN

EAGLE SHOWS "4 of a KIND"

This Bird holds all the Aces in Aggregate Washing

Battery of Four EAGLE WASHERS at Plant of Des Moines Sand & Fuel Co.

EAGLE sand and gravel washers in *your* plant will insure top honors in continuous and profitable production.

The Des Moines Sand & Fuel Co. of Des Moines, Iowa, is operating an "Eagle" washer installation. Its highly efficient performance has aroused considerable interest.

This company is working an artificial lake much fouled with coal, shale and general trash. When their aggregate has gone through the "Eagle" washers it passes any inspection. Des Moines Sand products have thereby earned a high reputation in this keenly competitive field.

Mr. Gaylord Gray, General Manager, says of "Eagle" washers: "After testing two in the old plant the specifications for the new called for the *battery of four* 'Eagles' to take care of increased capacity requirements."

AN "EAGLE" GUARANTEES A "GOOD DEAL!"

Eagle Washers, and Eagle "Swintek" Screen Nozzle Ladder, THE successful dredging equipment, are fully described in our bulletins. Send for them *today*.

EAGLE IRON WORKS

129 Holcomb Avenue Des Moines, Iowa

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*Hendrick Mfg. Co.
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New Holland Machine Co.
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*Robins Conveying Belt Co.
Screen Equipment Co.
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*Tyler Co., W. S.
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Frog, Switch & Mfg. Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Sprout, Waldron & Co.
Shovels (Electric, Internal-Combustion and Steam)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Industrial Brownhoist Corp.
*Koehring Co.
*Lima Loco. Works
*Link-Belt Co.
*Manitowoc Engineering Works
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.
Silos
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McCarter Iron Works, Inc., The
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Skids
*Easton Car & Construction Co.
Skip Hoists and Skips
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McCarter Iron Works, Inc., The
*Robins Conveying Belt Co.
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*Cincinnati Rubber Mfg. Co.
Quaker City Rubber Co.
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*Link-Belt Co.
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*Link-Belt Co.
Sprout, Waldron & Co.
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*General Electric Co.
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Steel (High Tensile)
Manganese Steel Forge Co.
Steel (Open Hearth)
Manganese Steel Forge Co.
Steel Grating (See Grating, Steel)
Steel Plate Construction
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
McCarter Iron Works, Inc., The
Sprout, Waldron & Co.
Stone Grapples
Owen Bucket Co.
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*Erie Steel Constr. Co.
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*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
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Besser Mfg. Co.
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*General Electric Co.
Switches (Electric)
*General Electric Co.
Switches (Safety)
*General Electric Co.
Tamp Machines (Hand, Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.
Tanks
*Chicago Bridge & Iron Co.
Heltzel Steel Form & Iron Co.
*Hendrick Mfg. Co.
*Link-Belt Co.
Louisville Drying Machy. Co.
McCarter Iron Works, Inc., The
*Traylor Engr. & Mfg. Co.
Tanks (Elevated Steel)
*Chicago Bridge & Iron Co.
Tanks (Sand-Settling)
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works
Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.
Tile Machines
Besser Mfg. Co.
Tools (Drill) (See Drilling Accessories)
Track Shifters
*Nordberg Mfg. Co.
Tractors
Caterpillar Tractor Co.
Trailers
*Easton Car & Construction Co.
Ford Motor Co.
Sterling Motors Corp.
Trailers (Dump)
*LeTourneau, Inc., R. G.
Trailers (Industrial)
*Easton Car & Construction Co.
Ford Motor Co.
Sterling Motors Corp.
Trailers for Excavators
Link-Belt Co.
Tramways (Aerial Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.
*Roebling's Sons Co., John A.
Transformers
*General Electric Co.
Transmission Belting (See Belting)

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

SIMPLICITY
GYRATING SCREENS

Use the correct basic principle of Positive Eccentric Action, produced by a solid shaft with the counter-balance machined directly thereon, an exclusive patented Simplicity feature.

Other Simplicity features are the special rubber corner supports, screen cloth in tension four ways over a doubly crowned screen deck, and sturdy all steel construction with each machine finished in every detail.

Simplicity Gyrating Screens are available in sizes from a 2′ x 3′ up to a 5′ x 12′ in single shaft assemblies; built in one, two, three, and four decks; as standard inclined types and also as low head types, where desired.

"New Bulletin No. 39 now available"

SIMPLICITY ENGINEERING CO.
DURAND, MICHIGAN

Enjoy Real Haulage Economy

with

DAVENPORT INDUSTRIAL LOCOMOTIVES

Your most vital concern in connection with the locomotives you rely upon is ECONOMY. Real economy demands not only efficient performance but the continuous performance which arises out of sturdy dependability year after year.

Davenport Industrial Locomotives have proven their worth on every continent and every type of haulage assignment for over forty years.

As you contemplate new locomotives we urge your careful consideration of Davenports. Tell us what your requirements are and Davenport engineers will gladly submit competent and reliable recommendations without the slightest obligation. DAVENPORT LOCOMOTIVE WORKS (a Division of Davenport Bessler Corporation), DAVENPORT, IOWA.

Write TODAY for Descriptive Catalog

PLANT AND MAIN OFFICE—DAVENPORT, IOWA
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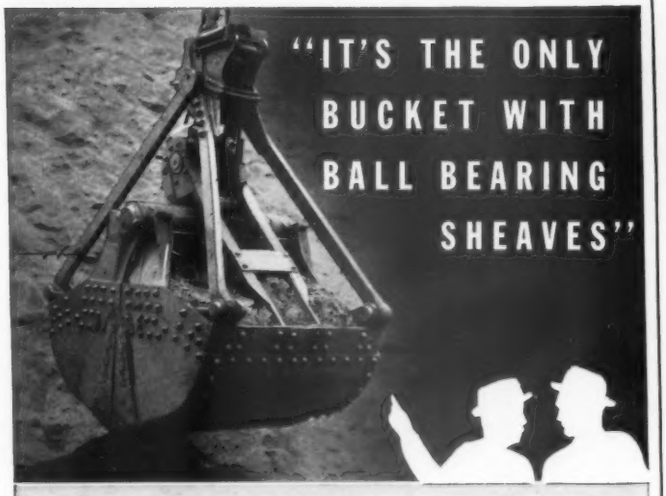
DAVENPORT — Sold all over the World — INDUSTRIAL LOCOMOTIVES

DAVENPORT LOCOMOTIVE WORKS

GASOLINE • DIESEL • STEAM
DIESEL ELECTRIC • GAS ELECTRIC



Yes, sealed ball bearing sheaves keep lubrication in and dirt out, to prevent excessive wear and prolong the life of the bucket. In addition Blaw-Knox Buckets make generous use of tough alloy steels to avoid excessive dead weight and provide worthwhile savings in rehandling costs. Write Blaw-Knox today for Bulletin 1606.

16

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Digging and Rehandling **BUCKETS**

Screening for Profit

WITH LINK-BELT VIBRATING SCREENS

● Hundreds of Link-Belt vibrating screen installations are proving their efficiency in screening for profit — handling a large variety of materials, such as sand, stone, gravel, coal, fertilizer, ores, grain, oil well drilling mud, chemicals, removing solids from factory wastewater, etc. Send for Book No. 1562.

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☐ Send Vibrating Screen Book No. 1562
☐ We are interested in a screen for _____
Name _____
Address _____
City _____ State _____

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Transmission Machinery
*Jeffrey Mfg. Co.
*Link-Belt Co.

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*Link Belt Co.

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Concrete Transport Mixer Co.
*Jaeger Machine Co.
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Taylor Forge & Pipe Works
Willey & Sons, Inc., A. R.

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Chicago Perforating Co.
Cross Engineering Co.
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Heltzel Steel Form & Iron Co.
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McCarter Iron Works, Inc., The
*Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

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*General Electric Co.

Welding Rods
Wall-Colmonoy Corp.

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*General Electric Co.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

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Alloy Steel & Metals Co.
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*Robins Conveying Belt Co.
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Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Twin City Iron and Wire Co.
*Tyler Co., W. S.

Wire Rope
*American Steel & Wire Co.
Bethlehem Steel Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Roebling's Sons Co., John A.

Wire Rope Fittings
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Page Engineering Co.
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Wire Rope Slings
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*American Steel & Wire Co.
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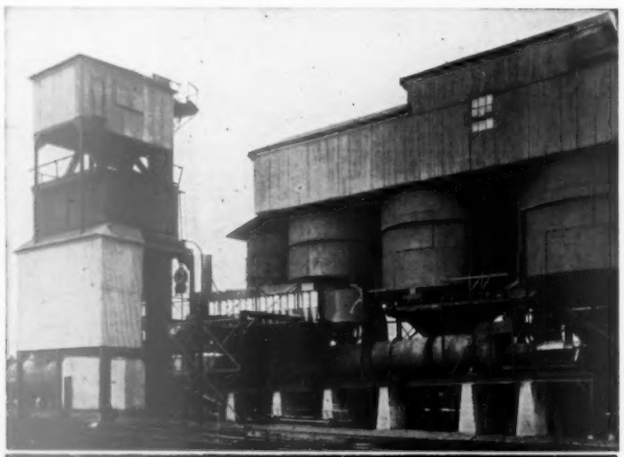
*Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

*See also detail information in the 1939 Pit and Quarry HANDBOOK.



WARREN ASPHALT PLANTS

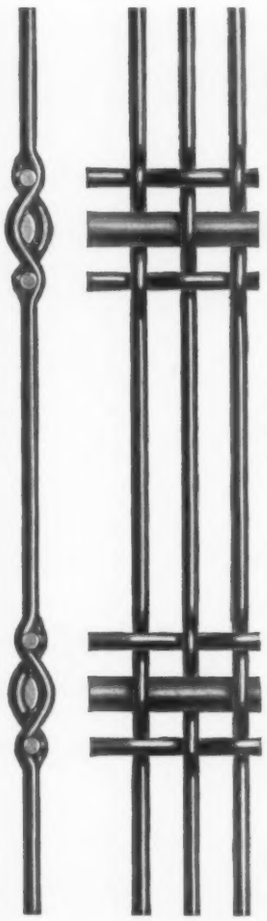
HOT MIX —— COLD MIX

—— OR ——

COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
—— By ——
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts



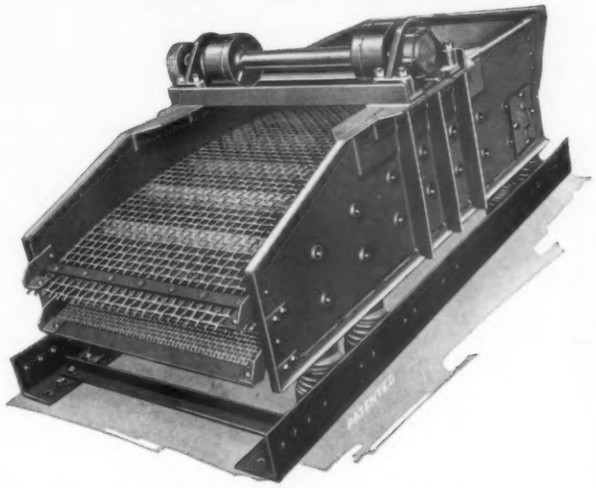
STA-TRU
Long-Mesh
Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS

DEISTER PLAT-O VIBRATING SCREEN



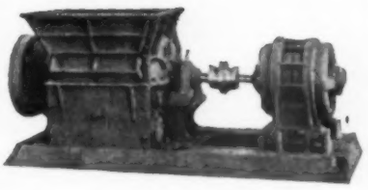
1. Simple powerful vibrating mechanism.
2. Screen cloth automatically held under uniform tension.
3. Any one screening surface changed without disturbing remaining decks.
4. Cushioned vibration.

DEISTER MACHINE CO.

1933 E. WAYNE ST. FT. WAYNE, IND.

AMERICAN "PULVERIZE" CRUSHERS

Rock Reduction Costs



AMERICAN Hammermills and Ringmills really "bear down" on high reduction costs.

Simple design and extra sturdy construction assure continuous operation under severest working conditions. Power consumption and maintenance get no chance to develop "growing pains."

AMERICAN Crushers deliver 10 to 100 tons per hour of a uniform product—and are a guaranty that your plant has reduced operating costs to the smallest possible "fines."

Write for Bulletin

AMERICAN PULVERIZER CO.
1245 Macklind Ave., St. Louis, Mo.

$17.50 PER SET

CAN BE QUICKLY ATTACHED TO YOUR OWN GRINDING EQUIPMENT

ROCK BITS KEPT SHARP

and drilling goes faster with a Pacific grinding attachment . . . Simple, convenient, practical . . . Any handy man can use it . . .

No special form wheels needed . . . Designed for standard wheels easily obtained from your nearby dealer.

The parts comprising this attachment are shown in lighter areas in above illustration. When desired, we can supply the complete unit including wheel, electric motor, etc.

When ordering specify MAKE AND THREAD SIZE of bit to be ground.

Ask Your Dealer

PACIFIC *Detachable Drill Bit* **GRINDER**

ALLOY STEEL & METALS CO.

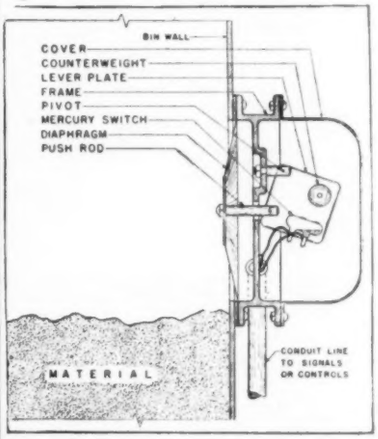
1862 E. 55TH STREET • LOS ANGELES, CALIF., U. S. A.

Manufacturers of Pacific Jaw Crushers · Pacific Bit Grinders
Handy Hoists · Machinery Wearing Parts

BIN LEVEL CONTROL

For bulk materials, semi-liquids, liquids.

CEMENT MAKER CONTROLS WEIGHING



A cement maker mounted one of our Bin-Dicators on a small supply bin over his automatic scales. He connected its mercury switch to start the weighing operation each time the bin filled to a certain point. It has been in service for 20 months, has operated 177,753 times to the day we took the record. It has needed no attention and needs none now. You can apply the Bin-Dicator on your own storage bins and hoppers to signal level of dry, wet or liquid materials, to operate filling, emptying, weighing equipment. Actuation is by varying material weight on the diaphragm shown in the illustration.

MAY WE GIVE YOU DETAILS FOR YOUR STORAGE BINS?

THE BIN-DICATOR COMPANY

14615 East Jefferson Avenue Detroit, Mich.

DIG, HAUL & DUMP . . .

for a few cents per cubic yard

PROBLEMS of moving gravel, sand, crushed rock, loose ore etc., distances of 100 to 1500 ft. are solved most cheaply with Sauerman Drag Scraper or Slackline machines.

There is a double saving when you use a Sauerman machine. You keep down your equipment investment and your daily operating expense is lower than with any other equipment able to dig and haul an equal yardage. One man handles the entire operation. Capacities range from 10 to 1,000 cu. yd. per hour.

Above is a simple setup of a Sauerman Scraper for storing surplus crushed material.

Sauerman Slackline digs a pit 1,000 ft. wide and 100 ft. deep, lifting material direct to the top of the plant.

WRITE for CATALOG

SAUERMAN BROS., Inc., 434 S. Clinton St., Chicago

Typical repairs and patches made with Flexco HD Rip Plates.

THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR FOLDER W R P that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The folder also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in five sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

Flexco HD Rip Plate

Flexco HD Belt Fastener

FLEXIBLE STEEL LACING CO.
4623 Lexington St., Chicago, Ill.

FLEXCO HD BELT FASTENERS
REG. U.S. PAT. OFFICE
Sold by supply houses everywhere

In Clay Pits . .

TOUGH DIGGING made EASY

The speed, power and flexibility of standard BAY CITY design makes easy going under tough conditions. Here is photo of 1¼ yard shovel turning out up to 1500 yards daily for Georgia Coating Clay Co., Macon, Georgia. Ask them about BAY CITY performance or write for Catalog H-3.

BAY CITY SHOVELS, Inc., Bay City, Michigan

BAY CITY SHOVELS

ROUND
SQUARE
SQUAROUND*
HEXAGON
PERFORATED PLATE
of every description
for maximum productiveness from your vibrating screens.
*Reg. U.S. Pat. Off

HENDRICK MANUFACTURING CO.
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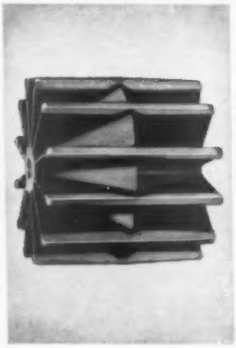
Sales Offices in Principal Cities. Please Consult Telephone Directory



DOUBLES THE LIFE OF CONVEYOR BELTS!

The most profitable investment in conveyor equipment! A pully that saves at least 50% on conveyor belts! This exclusive Sprout-Waldron development prevents material from coming between the face of the pulley and the belt . . . eliminates the heavy friction wear and punching of holes. Interchangeable with standard pulleys. *Write for list of sizes available.*

SPROUT, WALDRON & CO., INC.
136 SHERMAN ST. MUNCY, PA.

ELEVATORS, CONVEYORS, POWER TRANSMISSION EQUIPMENT

LIGHTNING

Heavy-Duty (Ball-Bearing) **Sand and Gravel Pumps**

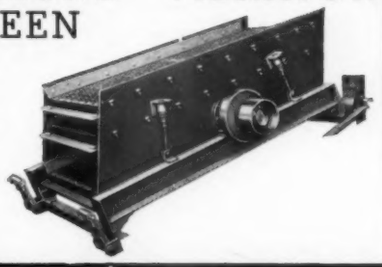
High efficiency—low operating cost—precision workmanship—wear-resisting, non-heating bearings even when operated under extremely high heads. WRITE

KANSAS CITY HAY PRESS CO.
KANSAS CITY, MO.

DIAMOND VIBRATOR SCREEN

Is the positive vibration type with self-aligning roller bearings. Its action produces vigorous vibration on all points of screen—no matter how heavily loaded.

Write for literature



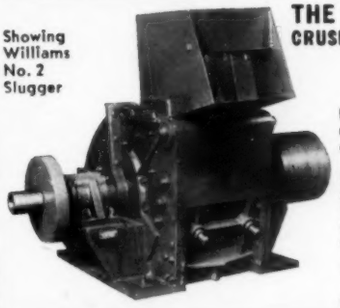
DIAMOND IRON WORKS INC.
AND THE MAHR MANUFACTURING CO. DIVISION
MINNEAPOLIS, MINNESOTA, U. S. A.

ROL-MAN
TRUE MANGANESE STEEL

screens

Highest abrasion resistance of any known steel. Double Lock Mesh Weave perpetuates initial accuracy for the life of the screen. Send for prices and performance facts.

MANGANESE STEEL FORGE CO., CASTOR AVE. & ALLEN ST., PHILA., PA.



Showing Williams No. 2 Slugger

THE WILLIAMS "SLUGGER" CRUSHER *for* MAKING 1¼", ¾" OR AGSTONE HANDLES LARGE STONE

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the grates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
802 St. Louis Ave. - St. Louis, Mo.

Williams
PATENT CRUSHERS GRINDERS SHREDDERS

SYMONS
CRUSHERS • SCREENS

FINER PRODUCT
GREATER CAPACITY
LOWER CRUSHING COST

These advantages have made Symons Cones first among reduction crushers.

SIZES CLOSER
SAVES HEADROOM
ACTION IS POSITIVE

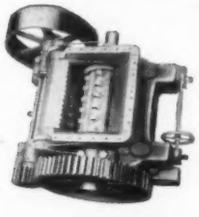
The trend is definitely toward level screening. Again Symons leads the way!

NORDBERG MFG. CO., MILWAUKEE WISCONSIN

Lewistown Foundry Products
ARE
Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.



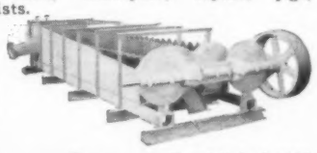
McLANAHAN EQUIPMENT

CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS

Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.



McLanahan & Stone Corp. *Established 1835* HOLLIDAYSBURG, PENNSYLVANIA

Before the Spanish-American War—since the days of William McKinley, we have been steadily at the job of making

BETTER SCREEN CLOTH!

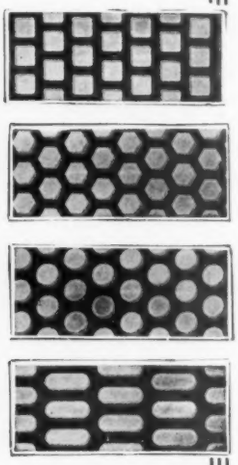
Watching the "little things," often so important in cutting your sc eening costs, for forty-three years we've been plugging ahead to whip your screening problems.
Today, our "old-fashioned" habit of accuracy and attention to detail is your guarantee of good screen cloth.

Order modern T. C. Alloy screens from

TWIN CITY IRON & WIRE COMPANY
Saint Paul *Write for Catalogue No. 38* **Minnesota**

CROSS
VIBRATING SCREEN PLATES

Now in constant use on all leading makes of Vibrating Screens. Save 1/2 to 2/3 of Screen renewal cost.
Satisfactory in every requirement.



If interested write us, giving make and size of Screen. We will arrange to secure further information necessary.

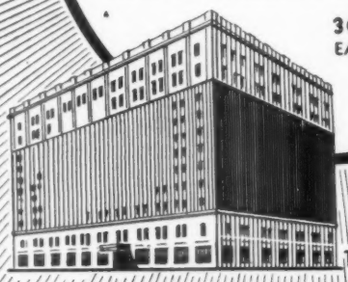
CROSS ENGINEERING CO.
Main Office & Mfg. Plant
CARBONDALE, PA.

● RESIDENTIAL SURROUNDINGS
● COMMERCIAL LOCATION

HOTEL FORT WAYNE

In addition to the superior accommodations at the Fort Wayne, guests enjoy a superb location in a residential community, yet convenient to the business districts. Hotel Fort Wayne provides economy without sacrifice of comfort or location.

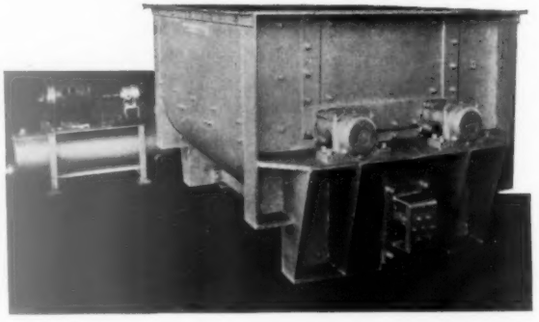
300 ROOMS
EACH WITH BATH
FROM $2



TEMPLE AT CASS
OPPOSITE MASONIC TEMPLE
DETROIT

Asphalt Plant "MUST" in 3 Letters

McCARTER MODERN MIXERS



McCARTER 2-Ton Mixers are **standard** in the leading asphalt plants. Steam or Electric heated Jackets—Steam or Hydraulic Oil cylinder operated Gates.

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16-ton Whitcomb Gasoline Locomotive, standard gauge, 6-cylinder, 6x7 motor, self-starter, 90% new. Running demonstration.

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25-ton capacity Ohio, 8 wheel, standard gauge, ASME boiler, double drum, 50 ft. boom.

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42″x48″ Traylor; 15x30, 18x36, 24x36, 30x42″ Farrel; 24″x36″, 36x48 Allis-Chalmers; 30x42 Buchanan.

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18—10′x30′ Vertican Tanks, 125 tons. At Peekskill, N. Y.
1—Blaw Knox 300 bbl. Cement Bin, electric scales, generator sets. Complete.

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2—No. 315 and No. 370 I. R. Portable—Oil Engine driven.
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1—PRE-2 I.R., 1300 CFM., syn. motor.
2—WN-31 Sullivan, 1573 CFM., syn. motors.

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3—5 and 6-roll Raymond Low Side Mills.
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2—6′x12′ Hardinge Rod Mills—direct drive.
2—6′x12′ Allis-Chalmers Rod Mills, inc. motors.
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4—8′, 10′, 12′, 14′ Gayco.
1—30″ Raymond.

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9—3′x20′, 4x30, 5x30, 6x40, 6x60, 8x60, 8′ 8″x85′.
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4′-0″ dia. x 30′ long Rotary Dryer, practically new, reasonably priced.

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Bucket elev. belts: 12″ wide belt, with 10″ bucket attached. 71 ft. and 47 ft. each length.
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30 Ton, 4 compartment Bin.
26' Reject Conveyor (Slightly used, as good as new).
NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.
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Page Crawler Dragline, 1¾ cubic yard bucket, 70 foot boom, Page Diesel Engine Power.

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Write for location and more detailed information.

Address all replies to

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PIT AND QUARRY PUBLICATIONS
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BRILL SPECIALS

4—**Crushing Rolls**, 40"x16", 36"x14", 16"x10".
2—Farrell, Allis Chalmers, 10"x20" **Jaw Crushers.**
2—Sturtevant 4"x8", 5"x10", **Jaw Crushers.**
1—No. 25 Kennedy Gearless **Crusher**, with 50 HP. motor.
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3—Hardinge **Ball Mills**, 2'x8", 5'x22", 6'x22½".
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Locomotive—Vulcan 32 ton standard gauge, 4 wheel saddle tank, 190 lb. code boiler.

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All equipment in first class condition.

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Crushing Rolls—16"x10" up to 54"x24"—Gyratory Crushers
Ring Roll Mills—No. 0 and No. 1.
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11—Bucket elevators; Rex and Weller, on chain or belt; all sizes.

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1—P & H Model No. 650, Serial No. 4188, 65′ boom; 1¼ yd. bucket.
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1—Link-Belt, K-1, Serial No. 1024, 50′ boom, 1 yd. bucket.
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4—Jaw Crushers: 1—12x26″ Champion; 1—10x20″ Climax No. 2½; 1—9x16″ Telsmith No. 9A; 1—9x15 Champion.
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4—13 yd. LeTourneau Type RY scrapers with Caterpillar RD8 Diesel tractors, new 1938.

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18″ Robins Belt Conveyors, 260 and 110 ft.
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36″ L-B Self-Contained Apron Feeder.
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New 14 & 22″ Rubber Cov. 8-p. Elev. Belt.
Lot of Chain, Sprockets, Buckets, Casing.
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All Sizes Centrif. Electric Water Pumps.
50 Solid 1¼″ Octagon-Shaped Tool Steel.
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800 hp. Patterson-Kelley Hot Water Heater.

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DIESEL GENERATOR PLANT

6-360 H. P. Units
2160 HORSEPOWER

INDIVIDUAL UNITS CAN BE PURCHASED.
IMMEDIATELY AVAILABLE FOR
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INSPECTION IN OPERATION.
FULL INFORMATION ON REQUEST.

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1—300 HP Winton Diesel Engine direct connected to 150 KW generator set.
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1100 CFM Bury 100 lb. air compressor.
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573 CFM Gard. Den. 55 lb. air compressors (3).
8″, 10″, 12″, 14″, 16″ centrifugal pumps.
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BOX 715
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

AIR COMPRESSORS

1721′ I-R, type PRE-2, Dir. Con. Syn. Mt. 100♯
1500′ I-R, type XB-2, Belted Ind. Motor, 100♯
1302′ I-R, type PRE-2, Dir. Con. Syn. Mt. 100♯
1052′ I-R, type XCB, Belted Syn. Motor, 100♯

SYNCH. MOTOR GENERATORS

750 KW WEST. 125/250 V., 2400 A.C., 900 RPM
500 KW G.E., 250 V., 2300/4000 A.C., 900 RPM
300 KW G.E., 125/250 V., 2300/4000 A.C., 900 RPM
200 KW G.E., 250 V., 2300/4000 A.C., 1200 RPM
200 KW G.E., 550 V., 2300/4000 A.C., 1200 RPM
150 KW WEST. 250 V., 2300/4000 A.C., 1200 RPM
100 KW G.E., 250 V., 2300 A.C., 1200 RPM

SYNCHRONOUS CONVERTERS

300 KW G.E., 250 D.C., 2300/4000 A.C., 1200 RPM
200 KW G.E., 250 D.C., 2300/4000 A.C., 1200 RPM
200 KW R.W., 250 D.C., 2300/4000 A.C., 1200 RPM
150 KW R.W., 250 D.C., 2300/4000 A.C., 1200RPM

(Each unit listed above is owned by us and is only a small part of our large stock, consisting of Battery & Trolley Locomotives, Transformers, Motors, Coal Crushers & Wheel Presses.)

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Incorporated
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Johnson concrete batching plant, complete, 100 yds. cap. with 300 bbl. cement bin, elevator, screw conveyor, etc. New 1937.
250 bbls. Blaw Knox cement bin, elevator, screw conveyor, weigh batchers, etc., complete plant.
155 bbls. Fuller cement bin, electric weigh batchers.
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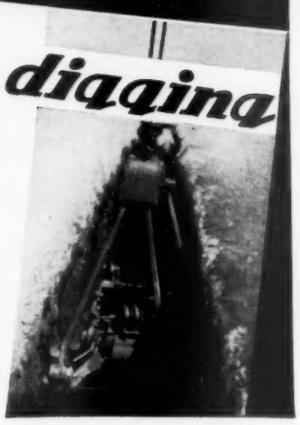

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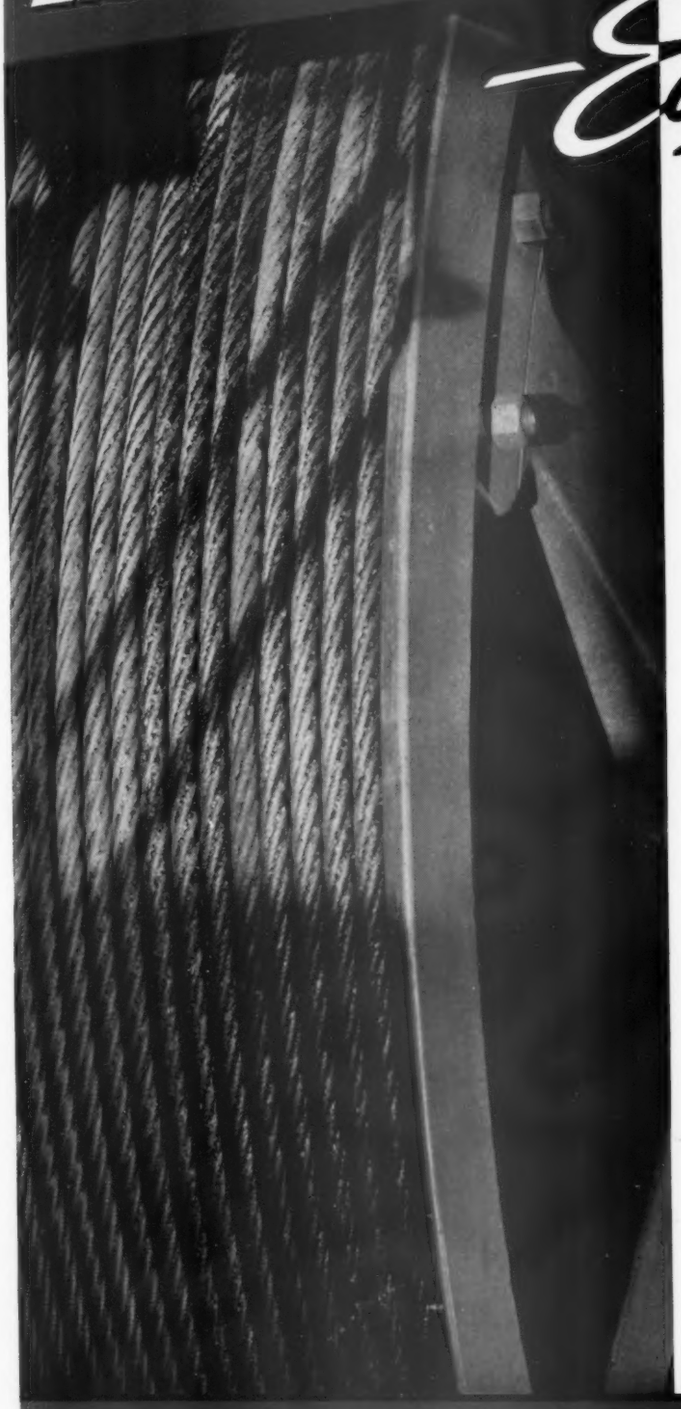

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